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ON THE THEORY OF THE OPERATION OF GYPSUM OR PLASTER OF PARIS, IN PROMOTING THE GROWTH OF PLANTS.

BY JOHN GORHAM, M. D.

(Read before a Society in Boston July 16, 1813.)

FROM the period of the introduction of sulphate of lime, gypsum, or plaster of Paris, into agriculture, the mode in which it operates in fertilizing soils, or perhaps more correctly in facilitating the growth of vegetables, has been a subject of much speculation. The question is not yet decided, nor probably can it be determined, until, by long continued observation and repeated experiment, a more extensive series of facts shall have been collected and properly arranged. From what is already known, however, on this subject, various conclusions have been drawn and at present we must content ourselves with that theory which best accords with the acknowledged properties of gypsum, with the nature and qualities of soils and with the economy of the vegetable system. I propose briefly to examine the plausibility of the different modes of explanation which have been offered on the action of this compound, and afterwards to state the theory which appears to me most obviously to flow from a view of the few facts that experience and observation have established.

The opinion respecting the operation of plaster of Paris, the most generally adopted is that, which supposes it to depend

on its power of absorbing or imbibing moisture. It has been said that dew is found more plentifully on those parts of a field, over which the plaster in powder has been diffused, than on those which received no gypsum. If this be the case, it must be owing either to the gypsum being a better conductor of heat than the earth with which it lies in contact, or to its power of attracting water from the atmosphere. Were the plaster in large masses, its heat might be conducted off more rapidly than that of the surface of the ground; its temperature would thus be diminished, or it would become comparatively cool, and thus be rendered capable of condensing the aqueous vapour contained in the air continually passing over its surface. But the plaster is applied in the form of powder; in that state its conducting power must be diminished, and it is very probable that it can neither acquire nor lose its heat with greater rapidity than the soil with which it is mixed. The truth of the assertion above mentioned is very questionable; it is supported on doubtful authority, and it is not advanced with that confidence which accompanies the expression of a fact which is universally acknowledged. The idea of its strong attraction for moisture, appears to have arisen from the fact that gypsum produces the most obvious and the most beneficial effects on dry soils, from which it may be supposed that plants cannot always derive the quantity of water necessary to their growth and vigour. But even on the supposition that it does possess, even in a very considerable degree, the property of imbibing moisture, it can hardly be supposed that the extent of this power is such, as to supply a rich growth of vegetables with additional water, which shall be sufficient to produce a vegetation more luxuriant than in ordinary circumstances. The amount of the powder of gypsum distributed over an acre is from two to three bushels, the layer consequently is very thin; it soon becomes mixed with the rest of the soil; it then exists only in small proportions, and it is difficult to conceive that in this state, it can absorb much moisture from the air. Besides in some cases, for example, where it is intended to accelerate the growth of indian corn, it is often applied immediately to the seed, in the proportion of about a tea spoonful to each hill, and like the seed is covered with a layer of earth. In this situation it can-

not be supposed to attract moisture from the air, nor is it more evident how it can exert any influence in this respect on the neighbouring soil, for it is impossible to conceive that even those substances which are known to possess the most powerful attraction for water, could, in this proportion, afford any considerable part of this fluid which is taken up in such large quantities by every healthy plant. The sphere of this attraction must in these circumstances be very limited, and if the soil immediately in contact with the gypsum, were to yield its fluid to this compound, we have no reason to suppose that it would be immediately supplied from that more remote, and thus establish a current, if the expression be not too strong, toward the seeds and roots of the plant. As the corn which has been treated in this way generally (if not always) flourishes more vigorously than when left to the powers of the soil alone, we may infer that the gypsum continues to act, after it has acquired a considerable height. It therefore appears absurd to say that a spoonful of this compound should thus be able to furnish, or should thus become the means of supplying any considerable portion of the water necessary to the sustenance of a large plant for weeks, even granting its strong attraction for that fluid. I may now, however, observe, that from our knowledge of the composition and properties of gypsum, we may safely deny that in its ordinary state it possesses this property in any degree, more than other earthy bodies, whose particles are not strongly coherent. It never exhibits this property, unless it has been exposed to heat. Gypsum is a compound of lime, sulphuric acid, and water. When exposed to a high temperature in a solid state, it loses the water necessary to its constitution, and falls into powder. The remaining compound of lime and sulphuric acid has then a powerful attraction for this fluid, and when they are mixed with each other, care having been taken that the quantity of water added should not exceed that which has been evolved, the semi-fluid again becomes a solid; a fact which is sufficiently familiar in the formation of *stucco*. When thus formed anew, the attraction for water ceases, for the gypsum remains dry and solid, while those salts or compounds which possess this property in the greatest degree, are the most deliquescent or the most disposed to become liquid on ex-

posure to the air, or moisture. Whence it appears that the natural compound of lime and sulphuric acid, at least that which is most common, and the only one employed in agriculture, is already saturated with water, that it is not deliquescent, and therefore that there is no probability, in reasoning from observation independent of direct experiment, that it has the smallest additional attraction for that fluid. It may perhaps be thought that the effects of gypsum on plants might be augmented by the use of the powder after its water had been dissipated by exposure to heat. But a moment's reflection will be sufficient to convince us that no additional advantage could be gained by this experiment. When deprived of its water, the attraction of the remainder for this fluid is so powerful that it would readily absorb as much as was required from the soil, but this water, instead of being transmitted to the roots of vegetables, would be arrested and combined with the other ingredients, and ordinary gypsum must of course be the result.

From what has been observed it may be justly suspected, if not actually believed, that the agency of gypsum in promoting the growth of plants, cannot with propriety, be ascribed to its power of absorbing or attracting moisture.

2. It has been thought by many that gypsum operates by accelerating putrefaction, or by promoting the decomposition of animal and vegetable matter.

It is much to be regretted that on purely practical subjects, and perhaps on none more than that of agriculture, we should content ourselves with loose and hypothetical opinions, unsupported by facts or experience. It would not be a difficult task for any gentleman farmer, with even a superficial knowledge of chemistry, to reduce a multitude of supposed truths to the test of experiment, and the result would probably be equally useful and honourable. If gypsum operate in the way I have just mentioned, it must be either, 1. by loosening the soil and thus allowing a freer access to the air, light, heat and moisture, or, 2. by increasing the temperature of the materials, or, 3. by affording something capable of exciting and continuing the fermentative process.

Some advantages may possibly be derived from gypsum by its mechanical effects of opening the soil or rendering it less

dense; but when we consider that it is added in comparatively small proportions and that in some cases it produces its specific actions, though applied immediately to the seeds or roots of the vegatable in even minute quantities, this effect at best can be regarded only as trivial. If the soil be composed principally of animal and vegetable matter, there is no doubt but that much greater benefit may result from ploughing, by which the mould would be more extensively exposed to the influence of the air, and would thus much sooner undergo those chemical changes, on which the subsequent fertility is in a great measure dependent.

There is no reason which should lead one to suppose that plaster can increase the temperature of a decomposing or decomposed vegetable mass; for as the heat generated in this process arises from fermentation and this again from chemical changes in the nature of the materials, the sulphate of lime must itself undergo some change or some decomposition to add to the fermentative matter and thus to augument its temperature. But, so far as we know, neither vegetable nor perhaps animal matter contains any thing which in the circumstances, in which they are placed, is capable of effecting this decomposition; for the attraction between the constituent principles of gypsum is exceedingly strong, and although potash, which is either contained in, or is formed during the combustion and perhaps the spontaneous dissolution of vegetables, is able to abstract the sulphuric acid from the lime, yet it is only when the alkali exists in excess, and its affinity for the acid is rendered more effectual by quantity, by heat, and by being long boiled with this calcareous compound. So far therefore we have no reason to believe that sulphate of lime can have any effect in increasing the heat of common soils, or of a mixture of animal and vegetable matters while undergoing the process of decomposition.

The last supposition, that gypsum may accelerate the putrefaction of the organized matter, with which it is mixed, by affording something capable of exciting or increasing the fermentative action, is still less probable. The species of fermentation, which takes place in this instance, is that to which chemists have given the name of putrefactive. It is the gradual re-

duction of organized substances into soil, in consequence of the operation of chemical laws, when not counteracted nor controuled by the principle of life. This action is spontaneous, and to be produced requires merely a moderate temperature, water, and contact with the air. There is no fact, with which I am acquainted, in favour of the supposition, that gypsum, as a compound, can facilitate this process, nor is there any thing in its composition analogous to animal or vegetable matter which can undergo this kind of decomposition. In the vinous and acetous fermentations, we know that these actions may be, and are, excited by the addition of yeast, or what some chemists have denominated ferment, a substance which, if not the same with, is at least very similar in its properties to vegetable gluten. The putrefactive fermentation may likewise be commenced by the mixture with a substance already in that state. But as sulphate of lime is incapable of fermentation, as it can furnish nothing which can produce it, and as, when mixed with the fermenting mass, it is found at the end of the process, unchanged in any of its properties, we may safely conclude that gypsum does not increase the fertility of soils by hastening the decomposition of organic bodies.

The only way we can conceive it to operate in this respect, is by depriving some of the vegetable productions of life, by which the ordinary affinities of chemistry may be brought into action, and thus the mass of decomposed matter or vegetable mould, and of course the quantity of nutriment, be indirectly increased. But there are no facts I believe to prove, that plaster when mixed with soils even in excess, possesses this positive power of destroying the life of plants, and this mode therefore of explaining the action of gypsum, is entitled to no greater weight than those which we have before examined. But it may be said that although neither of the circumstances above mentioned be sufficient, singly, to account for the acknowledged action of this compound, yet that it may be dependent upon and constituted by all of them; and therefore may be ascribed partly to its opening the soil, partly to its facilitating the putrefactive process, and in part to its attracting moisture from the air. The weight of this argument must depend on the degree of merit that has been attached to each of the hypotheses

It has been seen that with regard to the two last, we have allowed nothing in their favour, and have ascribed but little influence to the first; hence, if the arguments which have been advanced to disprove the correctness of these hypotheses, be allowed to be just, when considered separately, they must have nearly equal weight when united.

As the modes of action assigned to gypsum appear to be inadequate to the explanation of the facts hitherto observed, we must look farther, and on considering this subject, it seems to me to accord best with the supposition, that it operates on the roots of vegetables as a stimulant. To render this theory plain and intelligible, it will be necessary to premise that certain properties of life are common both to the animal and the vegetable system. They both possess the powers of absorbing, of circulating, of secreting, and of converting foreign matter into their own substance. All the phenomena of vegetation concur to prove that plants like animals enjoy a principle to which has been applied the name of irritability, and which is simply the susceptibility to contraction on the application of stimuli. It is probably the property which is the first developed and the last extinguished in all organized beings. Whether they also possess sensibility is a question which from our limited knowledge of the functions of vegetables, we are unable satisfactorily to answer. There are some facts which have induced a few vegetable physiologists to suppose that they do. If it be so, its phenomena are by no means so obvious as those resulting from irritability, and even this principle is not so apparent in the vegetable as in the animal system, for in the latter it is developed every moment, while in the former it requires some study to be perceived. This difference in the two systems is probably to be attributed to the greater rigidity of parts in vegetables which of course are less susceptible, and to an organization much more simple than that of animals, by which they may be deprived of that consent or connexion between various parts, which has been called sympathy. Whoever is acquainted with the physiology of plants, cannot avoid remarking that "the propulsion of the sap; the secretions whence new products are formed; the motions of their leaves; their susceptibility to the impressions of external agents, heat, light, air and moisture and electricity; their

growth, and the formation of the embrio plant with similar powers, are phenomena inexplicable on any principles of mechanism, and so strikingly analogous to those of the animal system, that they must be referred to the operation of a similar principle ;"* or a set of principles, one of which is irritability. The analogy between the properties of living animal and vegetable matter will appear even more intimate when we consider the circumstances by which their growth and vigour are accelerated or retarded and their condition is altered. In the former the proper balance of actions constituting health is preserved by the due regulation of food, of air, of exercise, and of temperature. If the food be moderately stimulant and nutritious, if the air be pure, the exercise equable, and the temperature uniform and mild, the operations of the system are free and unembarrassed. If the influence of external agents be excessive, or if the system be deprived for a time of its accustomed stimuli, disease and even death may follow. In the latter also the health of the plant is dependent on the degree of heat, and light applied, the quality of the air surrounding it, and the quantity of nutriment it derives from the soil. When excessive the plant is too highly stimulated; when deficient it languishes, and debility and disease may be the consequence either of too strong or too feeble action. Exercise also is probably equally necessary to the vegetable as to the animal system. Whence it appears that there exists an intimate relation of properties between the two great classes of organized beings, and that probably their functions may be continued by the operation of the same principles, modified by structure and situation.

Like animals then, vegetables may be more stimulated than usual. The effect would be to increase the natural actions of the parts thus excited, and when they are not excessive, the result would be a vigorous vegetation, and a more rapid developement of the organs. The metallic oxides, or compounds of metals and oxygen, the metallic salts, such as green vitriol, the native compounds of sulphur and iron, the neutral salts, such as nitre, &c. and the liquid oxy-muriatic acid, have been proved to promote the germination of seeds, and the growth of the plants.

* Murray's Chemistry, vol. iv.

These substances, it has been supposed, operate by the oxygen or the base they afford for the direct nourishment of the vegetable. But I am inclined to believe that they produce their effects as compounds and as stimulants, or if decomposed, that the use of the oxygen is rather to increase the action, than directly to augment the bulk of the plant; for although oxygen may be obtained from most vegetables, it has been for the most part previously combined with hydrogen in the form of water, which with more probability has been absorbed by the roots, than produced in the vessels of the plant. Why then may not gypsum operate in the same way? There is certainly no great incongruity in the supposition, and it is no argument against its acting on this principle, that it is perfectly inert as it regards the irritability of the human system. It has neither taste nor odour, nor any perceptible stimulant action on the organs of touch; but does it follow that it should therefore produce no effect on the seeds or roots of vegetables? Oxide of manganese and lytharge are inert to us, yet the experiments of physiologists appear to prove that they are not so to plants.

It may be supposed, that when the plaster of Paris is applied to the seed, it stimulates the little root, the action of the vessels is thus increased, absorption goes on more rapidly, and it acquires more nourishment in a given time than in ordinary circumstances, the consequences are a quick growth and enlargement of organs. If the stimulant effect be continued, the roots will become thicker than usual, they will spread to a greater distance from the centre, and perhaps penetrate deeper into the ground; hence in a given time, such a plant will absorb more fluids from the ground to be converted into sap, and to nourish the vegetable, than one which has not been thus stimulated; it will therefore be larger and more luxuriant.

It may be thought that if gypsum operate as a stimulant, it ought to produce the same effect in all cases, that is, it should act uniformly in all situations. But a slight view of the subject will be sufficient to convince us, that, as soils differ as much in nature as degrees of cohesion, some of them may contain ingredients which are in themselves highly stimulant, while others may, with regard to the vegetable fibre, be comparatively inert and bland. The application of plaster, to plants

vegetating in soils of the former character, would not be followed by any obvious advantage; while in the latter it might promote in a very considerable degree, the growth of the vegetables, by exerting a more stimulant power than any of the substance with which they are surrounded. This idea may perhaps afford an explanation of the fact, or supposed fact, that gypsum produces no effect on plants growing in the vicinity of the sea. These soils are generally impregnated with common salt, muriate of magnesia, and even gypsum itself; for the water which passes through them, or which is obtained from wells in this neighbourhood, uniformly indicates, with proper re-agents, the presence of these salts. This water, no doubt, in many places rises near to the surface of the ground, and being constantly applied to the roots of vegetables, stimulates them so highly that no additional advantage can be derived from the use of plaster.

NOTE. Since the above was written, I have seen a paper in the Emporium of Arts and Sciences, for August and September 1813, upon nearly the same subject. In one part of it the editor refers to a paper on the operation of gypsum, published in 1793. Mr. Cooper supposes it to act partly as a stimulant, and in part as a promoter of putrefaction. I have never seen this publication, but it gives me pleasure to find that our ideas on this subject so nearly coincide.

THE BEST SORTS OF FRUITS.

As much greater encouragement has been of late given in the metropolis, to the raising of good fruit, as the inhabitants of our great towns begin to discriminate the several species, and to pay liberal prices for the best, it is hoped and expected that a greater attention will be paid by cultivators to the quality of the fruits they raise.

One of the greatest impediments to the improvement of our fruit, is the great inattention which has heretofore been paid to the names of fruit trees. It is not uncommon to have the same

apple or pear known by four or five different names. A farmer hears of a new apple which he is informed, and very correctly, is a most admirable fruit. It is called the "Pecker apple." He says, that it is entirely new to him, and not doubting his friend's description, which was indeed exact, he engrafts all his remaining stocks with it. After waiting five years for the result of his labours and anxious cares, he finds his new engrafted fruit one which had abounded on his estate before, of which he had as many as he could use or sell, and which he had known under the name of the "Baldwin apple."

It certainly is important to have fixed names. It would be better to have them the same by which the same fruits are known in Europe.

We shall, in order to facilitate the extension of this sort of knowledge among our farmers, subjoin a list of some of the best Peaches, Cherries, Apples, and Pears, by the names under which they are known in Europe, and in the Southern States.

PEACHES.

The AUNE PEACH, commonly called the Early Ann, is a very fine fruit, ripens late in August.

The WHITE MAGDALEN is a good peach, but fitter for a wall, or a very sheltered situation, than as a standard. It ripens in August.

The RED MAGDALEN is an excellent peach, and ripens in September.

The NOBLESSE is a large, fine peach, ripens early in September.

The OLD NEWINGTON is a cling-stone, and is very high flavoured. It ripens late in September.

The SWALCH is a fine peach; ripens early in September.

The CATHERINE, sometimes called the GREEN CATHERINE, is a very fine peach; ripens in September.

The LEMON CLINGSTONE is a large, late, but beautiful and high flavoured peach. It ripens the last of September, and beginning of October.

The VANGUARD is also a good peach; ripens about the middle of September.

The BLOOD PEACH might sell for preserving. It makes a beautiful preserve. It is hardy and a great bearer.

All these Peaches may be obtained of any nursery-men in New York, or at Flushing, Long-Island, of Wm. and B. Prince, and buds may be had of most of the gentlemen in this neighbourhood.

CHERRIES.

There are but few kinds of this fruit, which merit general cultivation. The curious horticulturalist may collect fifteen or twenty sorts, but four or five kinds would be sufficient for general cultivation.

It is to be regretted that so little attention is paid by the farmer to cultivating those fruits which are considered as mere luxuries. We do not say that the cherry ought to enter into competion with the apple, but since the cherry tree would form a beautiful shade round his buildings, and would afford a pleasant, (and if left to ripen perfectly) a very salutary article of food, it is to be regretted that it is so seldom introduced.

Almost every man has a small garden spot; if he will not go to the expense of getting the stocks, he may always procure the cherry stones. They are of quick growth, and a very hardy tree.

It is easily improved by grafting and inoculation, and even the natural fruit is often very fine.

The species most valuable to a farmer would be,

The MAY DUKE, a red cherry, commonly called Kinsely.

The ENGLISH CHERRY. This is the most common in our country.

The BLACK HEART is the most common of the finer sorts, and is the most valuable, because a very free and full bearer. It is commonly eaten too early, because persons suppose it ripe as soon as it is red and pleasant. It should be left till it is quite black.

The WHITE HEART. This is a general name applied to two or three species. They are distinguished by some as the *Lukeward* and the *Bigarow*. The latter is the French name, and the several cherries under that name, are better described by French writers.

It is a large, beautiful fruit, less inclined to bear freely, and more liable to destruction by moisture.

The BLACK TARTARIAN CHERRY is a noble fruit, and a very good bearer.

Scions of all these sorts may be easily procured by applying to any of the Trustees of the Massachusetts Agricultural Society. Besides the above there are several varieties of the the *Mazard*, or natural cherry, which are very excellent fruits, and valuable for being later than the others. They are generally hardier trees, and will bear neglect better than the finer sorts.

APPLES.

This fruit being too generally considered only as affording a beverage, our farmers are apt to be indifferent to the species which they raise. The natural fruits, it is true, often make the best cider, but it is not uncommon to see a farmer who may make twenty or fifty barrels of cider, unable to pick out a single barrel of fine apples which he can preserve to a time when he wants them most, the spring of the year, when they are as salutary as they are agreeable. The scions of Apples may be procured and sent to any distance in March, and till the tenth of April, and if well taken care of, by being plunged in clay or moist earth, they may be inserted from the twentieth of March to the tenth of June. Any farmer might soon learn the art of engrafting, and their old orchards will furnish stocks. Trees are often preserved and renewed by heading them down and grafting them, if this is done judiciously.

The sorts which we should recommend for general cultivation are,

The RHODE ISLAND GREENING, a good *fall* and *early winter* apple.

The NONSUCH, a red apple, excellent, and very late keeping apple.

The NONPAREIL, a Russet apple, early in winter.

The NEWTOWN PIPPIN, a good, hard, late keeping fruit.

The SPITZENBERG. This is a fine fruit, and will keep sound till May or June.

The ROXBURY RUSSETING. This is one of the best known

and most valuable fruits. It is not fit to eat till February, and is very easily preserved till June.

The BALDWIN APPLE, (recently brought into notice, though it has been in the country probably for many years,) is a very valuable fruit, beautiful, fine flavoured, and will keep till the last of March.

There are at least fifty sorts of good apples, besides those above specified; we have only noticed those, which would be the most extensively useful as winter fruits. We have selected those which will always command a price in market.

PEARS.

This is a fruit remarkably well adapted to the climate of Massachusetts. It is much to be doubted whether any country in the world produces finer pears than have been raised in this state.

But the cultivation of them has been in a great degree confined to the vicinity of the metropolis. We probably have in this state nearly every good variety of pear known in France. We mention France, because in that country, more successful attention has been paid to this fruit, than in any country in the world. To the Hugonots who fled from France on the revocation of the edict of Nantz, we owe almost all the fine pears we have. They are to be traced to the gardens planted and owned by them. Although there are near an hundred species or varieties of pear cultivated in France, yet there are not more than ten or twelve which we should recommend to general cultivation.

We would observe, however, that the farmers who live near great towns, may very usefully and profitably extend the culture of pears beyond those who live at a greater distance.

In the remoter parts of the state it might however be thought worth while to plant a tree, the hardiest and most long lived of any fruit tree, with which we are acquainted, even if it only served to add an innocent luxury to the table of the farmer.

Those who live within thirty miles of a market-town might bring all their winter, and many of their summer pears to market.

Here we would remark, that the habitual negligence with

which every species of fruit is brought to market, is extremely to be lamented. It is almost fatal to the sale. It diminishes both the demand and the price. There are two great faults on this head. The one is, that the fruit is gathered unripe, under the pretence that if ripe it would not bear transportation. The other is, that it is thrown negligently into great masses, without the least trouble or arrangement, and then hurried over bad roads to town, where it is left exposed to the sun and flies, which soon destroy not only its appearance but its flavour and value.

Is this owing to a want of encouragement in our country? No. There are no people in the world more extravagant in the purchase of their luxuries than the Americans. Let one man set the example of bringing his fruit in better order, and he will receive a hundred per cent more, beyond the extra expense. Is there any thing in our country, which renders it impossible or unprofitable to our farmers to carry their produce to market neatly and in good order? We know of nothing. But we do know that fruits of the tenderest sorts are transported in England and France great distances, and exhibited for sale in the most perfect condition. Every fruit has its own peculiar mode of packing and conveyance. The strawberry and the cherry are carried in baskets of a conical form, so that there is no pressure, which would ruin these delicate fruits. We do hope to see our farmers not so sparing of a little straw or hay, and good baskets, and a little labour of packing, instead of turning peaches, and pears, and apples into a cart in one mass, a certain loss to themselves, and as great an injury to the purchasers.

The sorts of pears for common use, which may be recommended, are

The LITTLE MUSCAT, a small summer pear, ripe in August.

The several varieties of CATHERINE PEAR. They have all of them a general resemblance—summer pears.

The JARGONELLE, a fine summer pear, and a general bearer.

The SUMMER BERGAMOT, a green fine pear of an apple shape; ripens in September.

The BROCKHOLST BERGAMOT, a delicious pear, ripe early in October.

The BROWN BEURRE; the best pear which is known but short lived, ripens in October.

The ST. MICHAELS. It has a great variety of names, but is most commonly known under the above. It is a great bearer, hardy, will grow in any soil, is in eating from October to Christmas if taken good care of, and is among the most valuable pears which grow.

Mespire Jean

The MONS. IEAN is another valuable pear. It is ripe about the first of November, and will last till the middle of December.

The ROUSSELINE is also a fine fall pear, and will sell well.

The WINTER GOOD CHRISTIAN is a pear, which keeps well and may be transported a great distance, being very hard when gathered.

The VIRGOULOUSE and COLMAR resemble each other, and are very fine. They are December pears, and will sell well at market.

The CHAUMONTELLE is also a fine, late fall pear, and a great bearer.

But the pear which may be cultivated to the greatest profit; the most uniformly good, the best of the excellent pears for keeping, is the ST. GERMAIN. It is a hardy tree, and will endure a century. The pears barrelled up might be transported a hundred miles in December or January, and will always command a good price. Perhaps, however, they could not profitably be transported more than forty miles.

This very imperfect list of fruits has not been made out with a view so much to increase the profits of the farmer, as to shew to him that with a little pains, less than he often bestows in procuring a thing injurious to him, he might always regale his family and friends with what the richest and greatest men consider the most acceptable thing they can offer to their guests, most excellent fruits.

ON THE CUTTING OF CARROT TOPS.

THE following communication was made to the Trustees by the Hon. Justin Ely, Esq. of West Springfield. It will be observed that it is not an experiment made by himself, of course he cannot be responsible for its accuracy. In introducing it we think it our duty to remark, that we very much doubt whether on repeating the experiment, the same result will be found to follow. It is certainly very much against the prevailing notions of the physiology and growth of plants to admit that the roots of any plant will grow and increase in size as fast without its top as with it. Certain it is, as to most plants, in an early stage, if you deprive them of their leaves, the root will instantly be checked in its growth, and often die. One of the Trustees of this Society, having often heard the same proposition asserted as to potatoes, was induced the last year to make the experiment. Two rows of potatoes were planted in his garden with this view, and they were equally well situated and manured; of the one of which he cut the tops, the tubers or potatoes were not above half so large as those of the other, which remained untouched. We do not say these things to discourage the experiment; we should be pleased to have it tried again by many persons. It certainly would be a desideratum, especially in dry summers, when the pastures are much parched, to be able to cut a fine green fodder for cows, without injury to the future crop, and its importance will justify a repetition of the experiment.

MR. ELY'S COMMUNICATION.

"ON the culture of carrots it has been doubted whether their tops can be cut off as fodder for milch cows, without materially impairing the amount or value of the crop; on which I have the following information from a very credible person who lived some years in a family, about sixty miles from Boston, where two or three hundred bushels of carrots were yearly raised; part of which were topped twice in the season for cows. The

roots of those that were topped, grew larger and better than those that were not topped. Part of the crop was gathered in the fall, and fed out to hogs, cows, and horses, and part were left in the ground till the spring, when they were gathered and the crowns cut off to prevent their sprouting. In the spring some were washed, cut small, and mixed with meal or bran for young calves, intended to be raised. They were soon so fond of them as to eat them whole without washing. They were found to be very beneficial for them and to answer better than any other food."

ON THE ADVANTAGES OF EMPLOYING VEGETABLE MATTER AS MANURE IN A FRESH STATE.

[Vol. i. Trans. London Horticultural Society. Communicated by the President, Mr. T. A. Knight, Jan. 6th, 1812.]

WRITERS on agriculture, both in ancient and modern times, have dwelt much upon the advantages of collecting large quantities of vegetable matter to form manures; whilst scarcely any thing has been written upon the state of decomposition, in which decaying vegetable substances can be employed most advantageously, to afford food to living plants. Both the farmer and gardener, till lately, thought that such manures ought not to be deposited in the soil till putrefaction had nearly destroyed all organic texture; and this opinion is, perhaps, still entertained by a majority of gardeners; it is, however, wholly unfounded. Carnivorous animals, it is well known, receive most nutriment from the flesh of other animals, when they obtain it most nearly in the state in which it exists, as part of a living body; and the experiments I shall proceed to state, afford evidence of considerable weight, that many vegetable substances are best calculated to reassume an organic living state, when they are least changed and decomposed by putrefaction.

I had been engaged, in the year 1810, in some experiments, from which I hoped to obtain new varieties of the *plum;* but one only of the blossoms upon which I had operated, escaped

the excessive severity of the frost in the spring. The seed which this afforded, having been preserved in mould during the winter, was in March placed in a small garden spot, which was nearly filled with the living leaves and roots of grasses, mixed with a small quantity of earth; and this was sufficiently covered with a layer of mould, which contained the roots only of grasses, to prevent in a great measure the growth of the plants which were buried. The pot, which contained about one sixteenth of a square foot of mould and living vegetable matter, was placed under glass, but without artificial heat, and the plant appeared above the soil in the end of April. It was three times during the summer, removed into a larger pot, and each time supplied with the same matter to feed upon; and in the end of October its roots occupied about the space of one third of a square foot, its height above the surface of the mould being then nine feet and seven inches.

In the beginning of June a small piece of ground was planted with *potatoes* of an early variety, and in some rows green *fern*, and in others *nettles* were employed instead of other manure; and, subsequently, as the early *potatoes* were taken up for use, their tops were buried in rows in the same manner, and potatoes of the preceding year were placed upon them and covered in the usual way. The days being then long, the ground warm, and the decomposing green leaves and stems affording abundant moisture, the plants acquired their full growth in an unusually short time, and afforded an abundant produce; and the remaining part of the summer proved more than sufficient to mature potatoes of an early variety. The market gardener may probably employ the tops of his early *potatoes*, and other green vegetable substances in this way, with much advantage.

In the preceding experiments the *plum stone* was placed to vegetate in the turf of the alluvial soil of a meadow, and the *potatoes* grew in ground, which, though not rich, was not poor; and therefore some objections may be made to the conclusions I am disposed to draw in favour of recent vegetable substances as manures.

The following experiment is, I think, decisive.

I received, from a neighbouring farmer, a field naturally barren, and so much exhausted by ill management, that the

two preceding crops had not returned a quantity of corn equal to that which had been sowed upon it. An adjoining plantation afforded me a large quantity of *fern*, which I proposed to employ as manure for a crop of turnips. This was cut between the tenth and twentieth of June; but as the small cotyledons of the *turnip-seed* afford little to feed the young plant; and as the soil, owing to its extreme poverty, could not afford much nutriment, I thought it necessary to place the *fern* a few days in a heap, to ferment sufficiently to destroy life in it, and to produce an exudation of its juices; and it was then committed in rows to the soil, and the *turnip-seed* deposited with a drilling machine over it.

Some adjoining rows were manured with the black vegetable mould obtained from the site of an old wood pile, mixed with the slender branches of trees in every stage of decomposition, the quantity placed in each row appearing to me to exceed more than four times the amount of the vegetable mould, which the green *fern*, if equally decomposed, would have yielded. The crop succeeded in both cases; but the plants upon the green fern grew with greatly more rapidity than the others, and even than those which had been manured with the produce of my fold and stable yard, and were distinguishable, in the autumn, from the plants in every other part of the field, by the deeper shade of their foliage.

I had made in preceding years many similar experiments with small trees (particularly those of the mulberry when bearing fruit in pots) with similar results: but I think it unnecessary to trespass on the time of the Society by stating these experiments, conceiving those I have stated to be sufficient to shew that any given quantity of vegetable matter can generally be employed, in its recent and organized state, with much more advantage than when it has been decomposed, and no inconsiderable part of its component parts has been dissipated and lost, during the progress of the putrefactive fermentation.

ON THE CULTURE OF FLAX.

THE following short letter from Mr. Charles Hallet on the culture of flax is inserted principally because it tends to corrob-

orate the ingenious suggestions of the celebrated naturalist and cultivator, Mr. Knight, (published in this Number,) relative to the use of manures in an undecomposed and crude state; an idea which has also been much enlarged upon by a Virginia gentleman, who has published a pamphlet with the signature of *Arator*.

We mean to take no side in this new and most interesting question. We give the public the facts, let them judge or try experiments, as they please. We can only say, that there is ingenuity in the theory, and considerable evidence in the experiments. It is rather singular that, at the same moment, without any concert, an English naturalist of great eminence, and an American cultivator of distinction, should have come out in support of a theory entirely new, and that is, that manures instead of being reduced to a state of decomposition, should be used in as fresh a state as possible, and that all the time, labour, and expense bestowed in stercoraries, in accelerating fermentation, are not only lost, but a great deal *worse than lost*.

Mr. Hallet's short letter does seem to give colour and support to this theory, (if he has in fact been more successful than his neighbours,) and we should be more disposed to attribute this success to his ploughing in his stubble, than to his shallow ploughing, of the utility of which we must have some doubts. We invite experiments and remarks on this novel and ingenious theory of the best *state of applying* manures.

MR. HALLET'S COMMUNICATION.

Yarmouth, (Cape Cod,) Jan. 24, 1814.

Attending some years past to agriculture, and particularly to the raising of flax, which I have attempted with good success, I will state my method, as differing from that of my neighbours, particularly in one respect—other people generally dig up, and take off their corn stalks—instead of so doing, I gather my corn, and in the last of February following, I take a frosty morning, and cut with a steel hoe every stalk even with the ground. I think they keep the ground light, and are a very good manure for flax, as they will nearly all be covered up in ploughing, which I always do twice; first turning the sward

up, and then ploughing quite shoal the other way, across the first ploughing.

I have also improved my land very much by ploughing shoal, turning up neither clay nor sand, if it were but one inch deep; but then it requires double the hoeing.

CHARLES HALLET.

MODE OF RAISING FLAX, PRACTISED IN WATERBURY, VERMONT.

[Letter from Mr. C. Morse to I. P. Davis, Esq.]

DEAR SIR, *Waterbury, (Ver.) April* 4, 1814.

Agreeably to your request I send you some account of my mode of cultivating the *flax plant*. But as the soil and climate of this country varies so much in the different states, I shall not perhaps be able to give you any information that will be of service; since it almost wholly depends upon time, place, and circumstances, and how and in what manner you proceed. You will however find a pretty full and elaborate account in the Encyclopædia, and two interesting papers on the subject in the Memoirs of the Philadelphia Society for promoting agriculture, vol. i. published in Philadelphia in 1808. But after all you will have to depend on practical information, without which the theory will be of little use.

First, then, much depends on the choice of your ground; but this the *practical flax farmer* will be better able to judge of for himself than to confine himself to any given rules. The ground thus chosen must be more highly prepared by ploughing, harrowing, &c. than is commonly done. The quantity of seed necessary, is about three and a quarter, or three and a half bushels per acre, and requires to be sown very even and true; it is then harrowed in the common way, always finishing with the brush harrow. A slight sprinkling of ashes when it is coming out of the ground is now of great use, as it prevents the worms from eating the roots. When the flax is about four inches high, it is necessary to give it a pretty thorough weeding, as if well attended to at that time, the weeds will not again grow so as to injure the crop. The time for *pulling* is in the third set of blossoms, and when the centre

bowl has nearly attained its full size. It now requires to be pulled, bound up in bundles of a moderate size, and carried into the water, which must be a pool of about three or four feet deep, standing, but not stagnant water, and may be naturally or artificially formed.

The most difficult part of the whole process, and that which requires the most experience, is now commenced; as a single false step will easily destroy the whole crop.

The length of time it remains in the water depends on the warmth of the season, and the quality of the water, as it is necessary to check the fermentation at a particular height. When the fermentation is sufficiently high, it must be taken out, and spread on ground newly mown, or that is closely fed; that which is least likely to grow fast is to be preferred. It requires to be spread very thin and even, and carefully attended, till it is sufficiently bleached, when it is ready to be taken up, and is fit for dressing.

The length of time taken up in bleaching depends upon circumstances, and can be determined only by the judgment of the person who attends it at the time.

The dressing is the same as the common mode, and is generally well understood throughout the country.

Should you think the foregoing remarks of any use, you are at liberty to present them to the society, together with my best wishes for the success of an institution so highly beneficial to the community.

I am, &c. CYRUS MORSE.

NOTE. The flax raised at Waterbury, and in the towns of Stratford and Milford, is of a remarkably good quality. It is worth from twenty-five to thirty dollars per cwt. The common flax of the country is worth only about seventeen dollars per cwt.

CULTIVATION OF HEMP ON CONNECTICUT RIVER.

[Letter from the Hon. Justin Ely.]

CONSIDERABLE quantities of hemp have been raised in the towns laying on Connecticut river, for ten or fifteen years past.

It is water rotted, and when properly managed is as good as the best imported hemp, and some think it stronger and better, being never fermented and weakened in the hold of the ship, as all foreign hemp is said to be. The northern part of the United States may undoubtedly raise as much hemp as is wanted in it, and probably more, if the inhabitants can be persuaded to cultivate it, and there is no greater difficulty in it than in raising flax when equally accustomed to it.

Preparation. Hemp will grow on any soil, if made sufficiently rich with manure, and ploughed and harrowed three times at the least. Tough soils will require harrowing four or five times to pulverize and lighten the soil sufficiently. Fifteen or twenty cart loads of good hog manure, or stable, or other rotten manure, should be put on an acre for the first crop. Half or two thirds the quantity of manure will answer annually for the subsequent crops for any number of years. The manure should be ploughed in at the first ploughing, which should be deeper than the subsequent ones.

Some very rich soils, and low grounds near streams and bog meadows, and other meadows, when properly prepared, will raise one or two crops of hemp without manure. Around most barn yards, where the ground is rich, a quarter or half an acre of hemp may be raised with advantage. It is indispensable that the land be rich and mellow, to raise good crops of hemp. The land should be ploughed in April, as soon as sufficiently dry and warm. Turf land should be turned over in August or September preceding.

Seed. It should be sown early to secure a good heavy *harl* or coat on the stalk. From the eighth to the fifteenth of May is thought to succeed best on our warm lands on Connecticut river. The ground ought to be warm before it is sown, perhaps in colder soils it will answer as well a few days later.

The seed should be of the last year's growth, and well dried as soon as threshed, to prevent its heating, which spoils it.

Two bushels are sown to an acre; where more is sown, part of it will die. It should be covered with water twenty-four hours or more. When taken out and put in a tub, and while wet, six quarts of ground plaster of Paris should be put to a bushel, and stirred so as to cover every seed, and immediately

seed sown and well harrowed in; which will make it come up sooner and grow better. If the plaster cannot be conveniently procured, it may be dispensed with. The shade of trees is injurious to its growth. No cattle should ever trample it down while growing. It must never be flooded with water. When three or four inches high, a bushel of plaster of Paris may be strown on an acre, sparingly where the crop looks promising, and more plentifully where it is poor.

Pulling. If no seed is to be saved, the whole field should be pulled in August; when the farina falls from the male hemp on being lightly moved, and the leaves drop therefrom, and the stalk of the male hemp turns yellow. Men accustomed to the business pull a quarter of an acre for a day's work. It is spread on the land to dry, from four to six days. When dry, it is taken up and bound, with rye straw, in small sheaves, of two inches diameter, towards the top of the sheaf. As the sheaves grow drier and shrink in size, the bands are crowded nearer the roots to make the sheaves tight. They are then covered where sufficient barn room can be spared; or carefully stacked up in the field upon some boards or straw to prevent the rotting of the hemp on the ground. Some sheaves of straw should be on the top of the stacks, to prevent the rains from penetrating into them, which will very much injure them. All the hemp which is wet in the body of the mow or stack, is rotted and ruined thereby.

Saving the seed. Where seed is saved, it should always be from the largest hemp. At the time above mentioned for pulling the hemp, about half the land should be pulled all clean in strips or spaces about eight or ten feet wide, and the hemp spread thereon. Then spaces of seven or eight feet wide should be left for seed. What is then pulled, should be treated as above mentioned; the pullers of the hemp go through the spaces where the hemp is pulled, and reach in and gather out by hand all the male hemp, (which is called *thimbling* it,) and spread it on the other hemp; for if left it will dry up, and rot. A threshing floor should be prepared in some convenient place before the pulling of the seed hemp, by removing the loose earth to the sides of the floor, and then treading the ground down tight and hard.

The female hemp must stand four or five weeks longer than the other to ripen the seed. It must then be frequently examined, when some of the seed begin to turn brown, and shell out a very little when moved, the whole must be then pulled, and carried to the floor in unbound parcels of the size of a middling sheaf. The root end of the parcel is laid very near the floor, and at right angles with it—the second parcel is put at right angles with the first, with the seed end across the root end of the first—the third parcel is laid at right angles with the second, with the seed end across the root end of the second, and so to go round the floor. In like manner a second and third row are made round the floor, if needed, according to the annexed draft. In this way of

THRESHING FLOOR,

With the hemp to be threshed laid round it.

laying it the seed end of every parcel lays across the root end of the former parcel, and none of the seed ends come to the ground. When taken up to lay on the floor for threshing (after laying one or two days to dry) it must be handled very carefully to save all the seed. It is then threshed with flails. When threshed the parcels are shaken over the floor to save the loose seed. It is then bound into sheaves, and set up in parcels of six or eight sheaves to be further dried for one or two days, and then threshed again. The seed is then cleaned up, and spread on a floor to be dried, to prevent its spoiling. The hemp is then secured as above directed. The seed hemp be-

ing larger stalks than the other hemp, requires a little shorter time to rot it in the water, than the hemp which was first pulled. Much of the hemp seed will be broken and spoiled if threshed on a barn floor with a flail. If threshed on a floor, a stick much lighter than a flail should be used.

Rotting the hemp in water. Clear, soft, standing water is best for rotting the hemp. A short dam is generally erected across a brook to raise the water from four to five feet, with a sluice way and gate to draw off the water when necessary. The sheaves should be laid down in the bottom, and timber, plank and stones must be put thereon to keep the hemp under water. The dam gate being shut down, it is so to remain till the rotting is finished.

If it is necessary to rot two parcels in the same place, in one year, as is commonly the case where considerable is raised, the first parcel should be put into the water in September; it will then be sufficiently rotted in eight or twelve days, according to the warmth of the weather and water; great caution is necessary in rotting early in the season—the warmer the water, the sooner it will rot. In warm weather the hemp will be much injured by being kept two or three days too long in the water. When nearly rotted some should be taken out every day to dry and to try it, to prevent its being over rotted. When sufficiently rotted, as it will be from eight to twelve days, the water is drawn off, and the hemp remains twenty four hours to drain. It is then carried to grass ground, and spread about two inches thick to dry. After a few days it is turned over, and when sufficiently dry, bound in sheaves and set up into shocks of twelve to sixteen sheaves, where it stands till dressed out in clear frosty weather the following winter.

The second parcel should be put into water about the middle of October, and taken out in twenty or thirty days; the water being then cold, there is much less danger of over rotting it, than when the water is warmer; for two or three days will not then much alter it. When nearly rotted, some should be frequently taken out to dry, to prove it as above. When sufficiently rotted, the water is drawn off and the hemp taken out and laid on the adjacent land in the sheaf till dried or frozen till the sheaves will stand up; the sheaves are then set up against

fences, or in small stacks of twelve to sixteen sheaves in a stack, to stand and dry till fit to dress out in dry winter weather.

There is much less labour and less danger of rotting it too much when the weather and water are cold, than in warm weather. It is therefore advisable to delay putting the hemp into the water till October, if the quantity to be rotted can all be done at once.

Dressing the hemp. It is first broken in a coarse, long brake, the slats of which are about twice as far apart as in common flax brakes. It is then broke in a finer brake, similar to a flax brake, but somewhat longer. If the hemp is suitably rotted, most of the sheaves come out by braking and moderately shaking it. It is then swingled but a little, and very carefully, and the sheaves will shake out. When from nine to twelve feet long, as it sometimes is, it is cut in two to be dressed. Two hundred weight is a week's work for a raw hand to dress, but expert workmen will brake and swingle three hundred in a week. The sheaves are put in the barn yard, after the manure is all carried out.

Produce. Hemp produces from four hundred to eight hundred weight on an acre. The price from eight to twenty dollars an hundred. The seed gathered from an acre, is from six to nine bushels, and is worth from two to ten dollars a bushel. It is a profitable crop. Our farmers think they can make more by hemp, than by raising grain, or any kind of stock. It always brings cash. From *thirty* to *forty* dollars an acre is paid yearly, for the use of land fitted to raise hemp on.

A new kind of hemp. A late English author says—the Chinese hemp (Crotolaria *Juncea)* is said to be of a quality superior to the common hemp. In an attempt to cultivate it in England, it grew upwards of twelve feet high, and nearly seven inches in circumference, but the seeds will not ripen in England. The Chinese make paper of it.

Some of the captains of the American East India Ships may render an essential service to their country, by bringing some of the Chinese hemp seed to the United States for cultivation.

JUSTIN ELY.

West Springfield, January 26, 1814.

ON THE WILD OAT GRASS.

If the grass mentioned in the following extract is the same which has been lately cultivated on Connecticut river, and the seed of which was sent to Boston by the Hon. Justin Ely of West Springfield, under the same name, we can only say that from what we have seen of the plant, in the small specimens exhibited in our vicinity, it promises much.

It is really a species of oat (avena), and if the gentleman who sent us the following extract is right in considering the grass mentioned by the German writer, a bromus or festuca, they are certainly different plants, though ours was introduced by the name of "wild oat grass."

There are many points of resemblance between the grass lately recommended by Mr. Ely, and the grass described by the German writer. But it is impossible the grass we have could have been mistaken for a bromus or festuca. It is hoped that some gentleman will send to Europe, and procure the seeds of this grass so highly recommended.

UPON THE CULTIVATION OF WILD OAT GRASS,* AS ONE OF THE BEST HAY GRASSES TO BE RAISED FROM HEAVY, MOIST, AND SHADY GROUNDS.

[Translated from the German.]

The wild oat grass, the bromus giganteus of Linnæus, is a stem grass. It sends up very beautiful succulent stems, to the height of five feet. Its leaves of a clear green, are two feet in length, and an inch broad. The panicle is pendent, and the spikelets contain from four to six florets. The root firm, di-

* The original futtruturfyr is rendered "wild oat grass" for want of any other English name. Ray, in his *catalogus plant.* [p. 106] seems to have given it this name; he makes it of the genus *festuca.* Linnæus, however, and his successors, class it as a *bromus.* He describes it as "of the height of a man, leaves a finger's breadth, panicles at each joint of the stalk send out two peduncles, the root perennial, which in the other *bromi* is annual. [Flora Suecica 99.] Found in the dry woods of Europe." [Species Plant. 114.] It is *Triand. Digyn.* Dr. Rees inclines to follow Ray, in calling it a *festuca.* [*Trans.*]

vided into fine filaments, perennial. Though this grass is later in season than all other grasses, and does not bloom till July and August, yet it continues in bloom proportionably later, even till Michaelmas, and is green even till the end of November. It delights in a heavy, moist, and shady soil, does not refuse the closest loam, and will thrive in shady, moss grown spots, (such as we often find in the bosom of forests) also under trees, however close and thick, and even in shades impenetrable to the sun, where no other grass will thrive. But if it be taken into cultivation, and placed in soil but little manured and loosened, so it be not quite dry, it will thrive to admiration, and acquire great estimation for its unequalled increase. If you choose to let it run to seed, you will find it prolific, and the straw it yields is for length and firmness not surpassed by the finest ——— straw. It may be sown in shady fields, but then, like all perennial grasses, the first year's growth is tardy; the second year it is better, and reaches its perfection. The best season for sowing is the spring. It will be well, under thickly placed trees, if the ground to be sown be loosened with the spade, as if for a garden. In other fields, where there are no trees, the plough will do this sufficiently. As this is a late grass, it may be sown to advantage in good soils under barley, like other grasses. In this case thirty pounds of seed will be enough for an acre, and the process, like that which I have advised in the cultivation of honey-suckle, french, and other grasses. From forty to forty-five pounds of seed is the quantity to an acre, where this is the original crop.

In the second year, by which time it reaches its maturity, it may be mown twice. It is better though to cut it early, before it has thrown up the stems, and then you may mow it at least from three to four times. Although, as was hinted, it is none of the earliest of grasses, yet it remains later than any other hay grass in a verdant state, and is fresh and lively at a time when the rest of the vegetable kingdom is shrinking at the first blasts of winter. Those, moreover, who make a rowen of this grass, and sell it by weight, will find no small profit in its peculiar heaviness; and a dry, heavy rowen is the best. This grass is, if I may say so, a sort of grain, and is very grateful to cattle. It is rare that you find the leaves of any other

grass broader or longer, and withal more soft, succulent, and relishing. It accordingly agrees extremely well with cattle, and they may be fatted upon it, if given to them green or well cured. It may be sown under clover, and will thrive well; and the clover mixed with this grass, has the property of preventing the colic of animals. This is one of the good grasses, with which you may lay down new, sound, and rich meadows. For this purpose it should be mixed with the seed of honey-suckle, and French-ray grass, and yellow —— grass, and from six to eight pounds of each kind be sown to an acre. The ground should then, for the first year, be secured from cattle and sheep, and in the second year you will have a meadow which will henceforth produce the best, most nourishing, relishing, salutary, and abundant feed for cattle and sheep.

CHARLES EDWARDS' MACHINE FOR KILLING TICKS.

MR. EDWARDS' smoking machine for destroying ticks will no doubt prove a valuable acquisition to the sheep-holder.

LETTER FROM MR. EDWARDS.

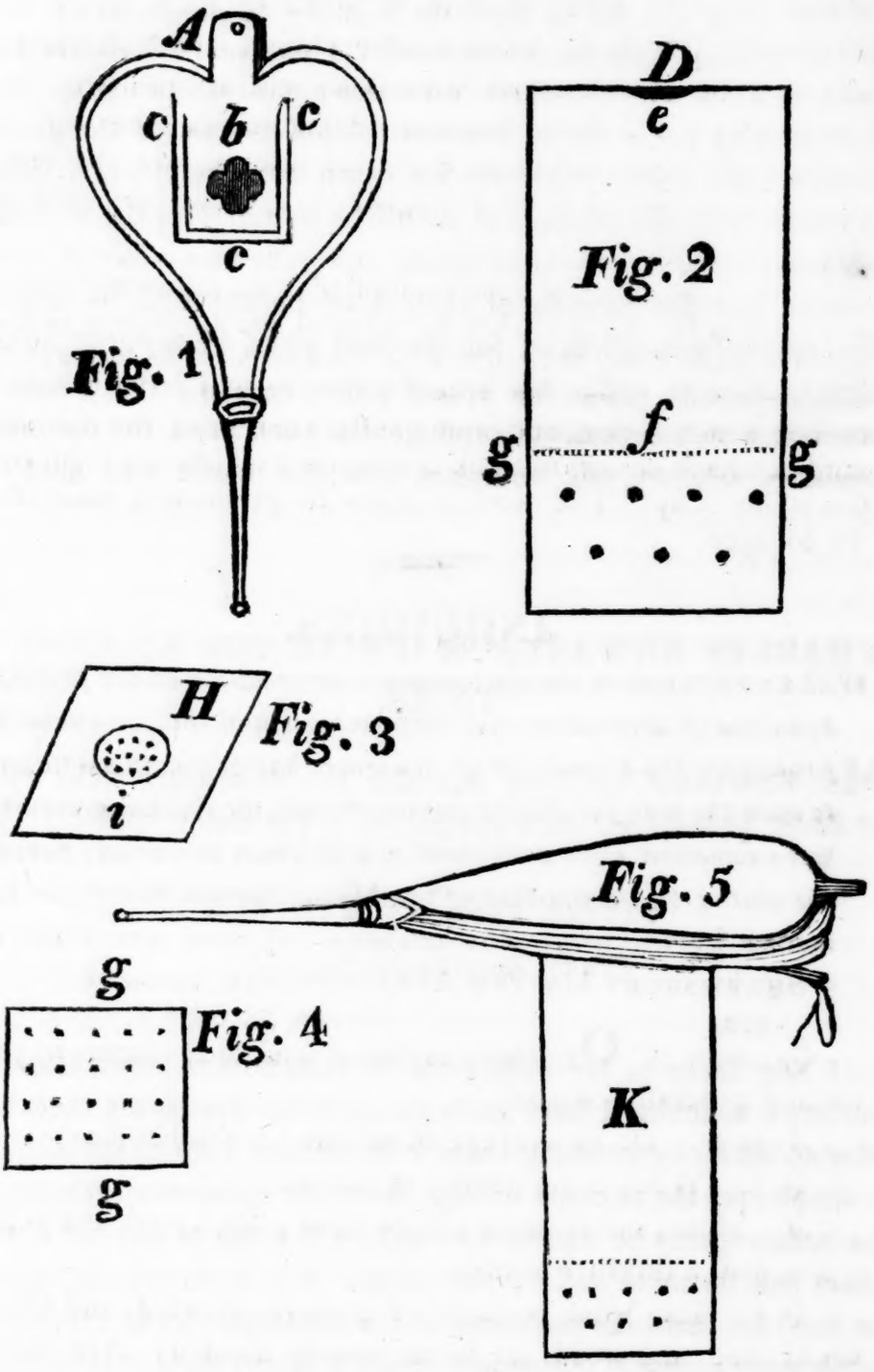
[To the Recording Secretary.]

SIR, *Boston*, 22 *March*, 1814.

I beg leave to lay before the Massachusetts Agricultural Society a machine I have lately invented for destroying ticks in Merino sheep by smoking them with tobacco; its construction is simple, and the expense trifling, the whole apparatus, including the bellows, may be had for two dollars if made of tin, and if of sheet iron for three dollars fifty cents. The bellows can always be used for domestic purposes, as the cannister can be taken off at pleasure: should the society deem it worth their acceptance, I shall be highly gratified. It has been much approved of by several gentlemen to whom I have loaned it as a pattern.

CHARLES EDWARDS, *Merino Agent.*

SMOKING MACHINE.



EXPLANATION.

Fig. 1. *A* a pair of common bellows; *b* the valve of the same; *ccc* the grooves into which the edges of the cannister slide.

Fig. 2. *D* The tin cannister, measuring six by four inches, contain-

ing the tobacco. *e* The mouth of the cannister, where it is charged. *f* A false bottom (perforated) inside the cannister, which admits the air. *g g* Air holes in the sides communicating with the false bottom.

Fig. 3. *H* The sliding top to the cannister, (perforated at *i*,) which is put on after the tobacco is lighted, and prevents the cinders from burning the valve of the bellows, yet does not obstruct the draft.

Fig. 4. *g g* The false bottom inserted inside the cannister at *f*.

Fig. 5. *K* The machine complete, and ready lighted, the nose of the bellows is inserted in the fleece, and the operation performed with ease.

Note. A decoction of tobacco, applied in the following manner, as a remedy for the *scab*, has been found also to destroy ticks—part the wool along the spine with the hands, so as to leave the skin exposed; place the vessel which contains the liquor in contact with the skin, and pour gently, continuing the operation until you have reason to think the liquor has diffused itself over the whole body. The wool receives no permanent stain from the tobacco.

INQUIRIES.

With a view to collect the most accurate information on the principal branches of agriculture, as now practised, and thus be enabled to propagate the knowledge of whatever shall be found useful, and to open the way for future improvements, the following inquiries were sometime since addressed to gentlemen in various parts of the state; by the trustees of the Massachusetts Society for promoting agriculture. The answers subjoined are from the "Shrewsbury United Agricultural Society."

Question 1. Of what quantity of land do the farms in your vicinity generally consist?

Answer. On an average about one hundred acres.

Q. 2. What is the quality of the soil?

A. Moist, and in some places stony; black, red, and yellow am, with a mixture of clay.

Q. 3. Into what portions of pasture, mowing, and tillage, orcharding, and wood, are farms usually divided? Are the orchards improving or declining? Do they yield a competent supply of cider?

A. One third mowing, one third pasturing, about one third of the other third is tillage land, the rest woodland; orcharding

included in mowing and pasturing; generally the spontaneous growth of apple trees is the most thrifty, the most productive, and the most durable; appropriate orchards are more exposed to canker worms, and are generally on the decay in this vicinity.

Q. 4. How much land on each farm is annually (on an average of years) planted or sown with grain of any kind?

A. This depends on the size of the farm, on the soil, and the ease with which the lands are tilled. On farms of sixty or seventy acres there is planted and sown from ten to twelve acres annually.

Q. 5. In what manner is the land prepared, manured, and seeded with each kind of grain, and what is the medium crop?

A. For rye, old fields are generally ploughed in June; about the first of September the furrows are crossed with a harrow; the rye is then sown, and the harrow drawn over again to cover it. On new land the brush are cut in June, and burnt about the last of August; the ground is then ploughed, the rye sown, and harrowed in as before. Oats, barley, and spring wheat are usually sown on fields where corn has been raised the year before; the corn hills are ploughed about the the first of April, the ground is passed over with a harrow, the grain is sown, ploughed in with a light horse plough, and then, if grass seed is sown, it is smothered again by a bush harrow; if the season will admit, it is better to get in wheat the latter part of March, the earlier the better. No manure is put on the ground at the time of sowing rye, oats, barley, or wheat, but oats, barley, and spring wheat are sown on cornfields usually which have been well manured the year before. For corn the ground is generally ploughed in June, if other business will permit, sometimes the last of August, and sometimes later, for the next season. On the ensuing spring the manure is carted on the furrows; the furrows are then cross ploughed, and sometimes harrowed; the rows are then struck out with a horse plough at the distance of three and a half feet, one way, and three feet the other; a shovel full of manure is put into the hill, then the corn is dropped and covered; care enough is not taken in dropping corn to spread the kernels about three inches apart to prevent the roots from crowding too hard; five kernels are put into a hill. The quantity of rye raised on an acre will average about 15 bushels, oats 35, barley 18, wheat 12, and corn 35 per acre.

Q. 7. What is the quantity and value of the straw on an acre of barley, rye, oats, and wheat respectively? and to how much upland hay are they respectively equivalent for fodder?

A. From fifteen to twenty hundred weight each. Barley and oat straw may be equivalent to one half the quantity of upland hay, wheat straw to one third, rye straw is worth but little for fodder.

Q. 8. What is the value of straw of each kind for any purpose, either for fodder or litter?

A. Rye straw is valuable in making cider, and also for making braid for bonnets; for the latter, great use is made of it in this and other parts of the country; other kinds of straw are but of little use except for fodder or litter.

Q. 9. What is the value of the stover or stalks on an acre of Indian corn, and to what quantity of upland hay is it equivalent for fodder?

A. The stover that may be saved on an acre of Indian corn is worth, to be made use of in a stock of cattle in the winter, as much as from twelve to fifteen hundred of good upland hay.

Q. 10. What quantity of land on a medium farm is annually planted with potatoes? How is the land prepared? What quantity and kind of manure is applied to an acre, and in what manner? How much seed is used, and how is it selected? How are they cultivated, and what is a medium crop?

A. The land planted exceeds one acre, and is prepared by being ploughed twice, and sometimes is harrowed. Twelve loads compost manure are applied to an acre, and generally put in the hill. The quantity of seed is twelve bushels, and but little attention generally is paid in selecting it. They are cultivated in hills, hoed twice, and yield one hundred and fifty bushels per acre.

Q. 11. How many bushels of potatoes are equivalent to one bushel of Indian corn, for sale?

A. Three bushels.

Q. 12. How many days labour of a man are usually employed on an acre of Indian corn, including the getting in all the stover, and stripping the husks from the ears?

A. Sixteen days, including oxen, and cart, and plough, calculated as follows, viz. ploughing one acre twice is two

days work, for a man, and two for a boy, equal to one of a man, making three days, four oxen the first ploughing being one day, equal to a man one day, second ploughing, one yoke of oxen, one day, equal to a man a half a day, one man and four oxen one day carting and spreading manure, equal to a man two days; furrowing out the ground and planting, including boy, corn, and plough, equal to a man one and a half days; ploughing and hoeing the corn three times, including plough and horse, equal to a man four and a half days; cutting stalks, securing them, and harvesting corn, three and a half days; total, sixteen days.

Q. 13. What is the labour of shelling a hundred bushels of Indian corn, and in what manner is it performed?

A. It may be performed by one man in two and a half or three days, by being put into a tub or rack, and pounded off with a wooden mall made for that purpose.

Q. 14. How many days labour of a man are usually employed on an acre of potatoes, including the getting in the crop?

A. Seventeen days, including oxen, cart, and plough.

Q. 15. Is there any order or succession of crops known to be beneficial or pernicious to the soil? If any, what is it?

A. A change of crops is generally practised, not so much because any order or succession of crops is thought to be beneficial or injurious to the soil, (though some may be more so than others,) as because there is not manure enough made to manure all the tillage land in each year. So long as there is not manure enough, for all the tillage land, so long a succession of crops may be necessary in order that each part of the tillage land may receive its proportion of manure. Such crops as require much nourishment to bring them to maturity, and when gathered leave little or nothing on the ground to enrich it in return for what it has received, will impoverish the land; among these corn may be accounted the principal, while on the other hand, potatoes in successive crops may be considered beneficial to the soil, on account of the manure made from the vine, and stirring of the earth late in the fall, in digging them; nor do they exhaust the land so much as corn.

Q. 16. What is the usual course of crops?

A. When new land or grain land is ploughed, the first crop is ordinarily rye or potatoes, then interchangeably Indian corn or potatoes, and oats, barley, or flax; potatoes are ordinarily considered as best to precede flax, probably because the ground being stirred towards the winter, by digging the potatoes, it is not so much infested by worms and other insects which devour flax the next year.

Q. 17. What is the medium quantity of hay produced on an acre of upland, and what is the labour of mowing, curing, and housing it?

A. The uplands in this vicinity will not, on an average, produce more than twenty-five hundred per acre, except by sowing plain fields with clover and herds grass seeds, two or three years after tilling and manuring them, when they will produce two tons per acre for two or three years, when they may be fed or ploughed. The labour will depend on the quantity produced, and will on an average be two days work of one man beside the ox work.

Q. 18. What is the medium product of hay on an acre of fresh meadows, and what is the labour of mowing, curing, and housing or stacking it?

A. About one ton; the labour to be bestowed about three days for one man.

Q. 20. Is there any tillage land laid down with grass seeds, without sowing grain at the same time? If so, which method is found best?

A. None in this vicinity.

Q. 21. What are the kinds of grass cut on the upland for hay? what proportion is from seed sown by hand, and what are the kinds thus sown, and in what quantity respectively per acre.

A. Kinds of grass cut on upland are red and white clover, herds grass, spear grass, red top, and Cambridge grass, so called. The proportion of seed sown by hand, is about one half; grass seed generally sown is red and white clover, and herds grass. The quantity of seed sown on the acre is about five pounds of clover, and four quarts of herds grass upon land in a middling state of cultivation; the higher the state of culti-

vation, the more seed is necessary, otherwise the grass will be too rank.

Q. 22. Are any grass lands now seeded after scarifying them with the harrow only, or in any other mode without ploughing? and what is the success of such practice?

A. None in this vicinity.

Q. 23. What weeds, vermin, or insects infest the mowing lands?

A. White and yellow weed, but little; some years many mice, moles, and grasshoppers.

Q. 24. Are the spontaneous or cultivated grasses infested most?

A. The spontaneous.

Q. 25. What methods are used to destroy weeds, vermin, or insects, without ploughing the land, and what is their success?

A. Little attention is paid to destroying vermin, except canker worms and caterpillars; the first by tarring the trees, which is the only effectual method that has been found in this vicinity, and the other, to wit, the caterpillars, by taking off the bunches or gums with the eggs in them towards winter, or by destroying their nests soon after they hatch in the spring, by putting strong soap-suds or fish-oil into them; laying a sod of earth in the crotch of a tree has been found early in the spring to check their progress.—Of weeds, the yellow and the white weed are the most troublesome; we know of no effectual method of destroying them, but digging or pulling them up. Sheep will check them, and so will mowing them early, before the seed is ripe. Gypsum or plaster of Paris has lately been found effectual for destroying white weed.—The Canada thistle is creeping into our pastures.

Q. 26. What kind of beasts, and in what numbers are they respectively kept on medium farms? and how are they subsisted?

A. A farm of 100 acres of a medium quality, that is economically cultivated, keeps well the following variety and numbers of beasts: viz. 15 head of horned cattle; consisting of 2 oxen, 7 cows, the residue in young stock of various ages, together with 1 horse, 12 sheep, and 6 swine.

Q. 27 In what place, and in what manner, are cattle fed with the coarse winter fodder? Is it given in the stable, in the yard, or in the field? Is it chopped, or given whole.

A. In the stable; and in the coldest weather in the yard also; always given whole.

Q. 28. How much butter is usually made in a year from one cow, all the cream being churned; and how much skim milk cheese is made from the same cow?

A. From a medium cow, 100 pounds of butter are made in a year, all the cream being churned, and 150 pounds of skim milk cheese, all the milk being used for that purpose.

Q. 29. What food is usually given to sheep besides grass and hay?

A. A small quantity of corn or oats in the winter, especially for ewes, five or six weeks, and turnips or potatoes two weeks before they lamb, to increase the quantity of milk, and render it more safe and suitable for the support of the lamb. If the sheep lamb before they go to grass, the milk is apt to be too thick and sizy, unless they have potatoes or turnips.

Q. 30. What is the value of the subsistence of a sheep through the year, besides the pasturage?

A. Sheep need but little food dealt out to them while the grass is not covered with snow, the pasturing of five sheep is 25 cents per week, which is equal to the pasturing of one cow; but during the winter season they should have a little corn, and sometimes potatoes.

Q. 31. What is the value of pasturage for a sheep, compared with the pasturage of a cow?

A. Five sheep are considered about equal to one cow; the cow 25 cents per week, the sheep 5 each.

Q. 32. What is the ordinary weight and value of the flesh of a sheep when fit for the butcher? and what is the quantity of wool in a fleece?

A. The ordinary weight of a sheep is about fifty-six pounds, and the value four dollars forty-eight cents, or eight cents per pound, and the quantity of wool on the same sheep, three pounds.

Q. 33. What breed of swine are propagated? How are they fed? how fatted? at what age are they killed, and what do they then weigh?

A. The Byfield and the Russia; but there are various other kinds; we think the Russia to be the best; they are generally fed through the first winter on potatoes; some given raw, and some boiled with a little meal, then mixed with them: they are generally fatted with a provender of corn, or oats, ground into meal; some are killed from nine to twelve months old, and weigh from two to three hundred; others are killed from twelve to twenty months old, and weigh from three to five hundred, and some weigh more.

Q. 34. What number of bee hives are kept? what is their product in honey and wax? what is the management, and what are the obstacles which discourage their extensive propagation?

A. Bees are diminishing in this vicinity, and the product in both honey and wax is small in most hives. Bees do not flourish in old settlements as in new—perhaps because of the different stocks, and their nearness together in old settlements, whence arise wars and fightings among them, and they destroy one another. Another reason may be the want of that rich variety of those productions of nature with which new settlements abound; the best substitute for these is thought to be the culture of buckwheat; being what bees in the season of it prefer to any other flower among us.

Q. 35. What is the usual quantity of land sowed with flax seed? how is it manured and cultivated? and what is the medium product of flax and seed in quantity and value?

A. The soil has so long been cultivated in this vicinity, that flax does not do well here, and very little is raised among us.

Q. 36. How much labour is employed on a quarter of an acre of flax before it comes to the spinner, and including the preparing of the seed for market?

A. Fourteen and a half days.

Q. In what articles consists the surplus of the farmer which is sold or exchanged for other articles?

A. In this vicinity the principal articles of surplus are pork, beef, butter, and cheese.

Q. 38. How many loads of manure are collected (30 bushels to the load) from the cattle in the barn yard of a medium farm in a year—specifying the number and kinds of cattle kept on the same farm, and the manner in which they are kept, in relation to confinement, or ranging abroad?

A. A ton of hay will make a load of manure of 30 bushels to the load, and the quality of manure will be in proportion to the quantity of hay—two tons of hay are allowed for the wintering of an ox or a cow, and two loads of manure of 30 bushels each expected for each ox or cow in that time, and about half that quantity of manure in the summer, if the creatures are yarded during the night, and about four loads from a horse if stalled the whole year.

Q. 39. What quantity of manure is made in the hog-pen—specifying the number of swine fatted, the kinds and quantity of food consumed, and the weight of flesh produced?

A. The result of this question depends much on the breed of swine selected for the above experiment, and also on the quantity of materials carried into the hog yard for the purpose of making manure. Let the hog yard be about forty feet square, including a shelter that will render their lodging warm and dry, put therein the latter part of May five pigs that are six weeks old, of the most improved breed, then cause the several kinds of materials, best adapted for making hog manure, such as meadow or pond mud, loam, or wash of roads, together with any kind of green vegetable, to be carried into the yard, at suitable times, keeping the several kinds properly proportioned; let the manure made the first year, be removed out of the yard the next spring, and the yard stocked with materials as before, by which mode of management not less than seventy loads (of thirty bushels to a load) of manure in the course of two seasons may be obtained, and of the first rate for drills or holes. Let the said swine be fed in the ordinary way till they are about sixteen months old, from which time give them meal made of corn and oats, only a third of the latter, together with potatoes boiled or steamed, and properly mixed therewith, until they have consumed 75 bushels of meal, and 90 of potatoes, and given them in as short a time as they will eat their meals clean—

then let them be killed—weight of flesh produced rising of one ton.

Q. 40. What methods are used to enlarge the quantity, improve the quality, or prevent waste of the manure made in the barn yard or hog pen, and especially to save the stale of the cattle?

A. Within a few years the quantity of yard manure in this vicinity has been increased to a considerable degree by having mixed with it meadow mud, loam, wash of roads, straw, weeds, &c. Some pains is taken to prevent in great rains the water that falls in the barn yard from running off, which if it does, not only the quantity is lessened, but the quality of the manure is injured.

Q. 41. Is the manure and tillage labour exclusively applied to the best parts of each farm?

A. Generally, and that is one great reason why some parts of a farm continue to be so much better than others.

Q. 42. In what manner, and for what purposes is manure used, except those indicated in the foregoing inquiries?

A. We know of none in this vicinity.

Q. 43. What other manures are used besides those created by the stock, and what are their merits compared with these?

A. Besides the manure made by the stock of cattle, considerable is made by swine, which is superior to any other, if properly fermented and rotted—also street manure is much used, where it can be collected in hollow places by the sides of the way—also the wash of adjacent lands when it can be collected, and turf and mud from dykes and ditches when well rotted, and mixed with the manure of stock, are so far meliorated as to render the whole on grass land equally valuable with so much clear stock manure.

Q. 44. Is lime stone found in your vicinity?

A. There is none.

Q. 45. Is buckwheat cultivated for the food it yields? or is it used to cleanse the soil from weeds, to fertilize and enrich it, or for any other purpose?

A. It has not been sufficiently cultivated in this vicinity, as yet, to discover its usefulness for any purpose.

Q. 46. In what manner are new lands brought under cultivation? Is it customary to plant orchards in the new settlements?

A. This question we leave to be answered by people of new settlements.

Q. 47. How is land cleared, which bushes and underbrush have overrun, since the trees were carried off?

A. The best way to clear and subdue bushes is by ploughing and planting with potatoes, which leaves the land in fine order for Indian corn or English grain—mowing them twice a year for two or three years will kill them, but is more expensive than ploughing.

Q. 48. What is done with swamps or swampy lands?

A. Some are drained by ditching, and mowed, and sometimes thickly coated with stones, gravel, wash of roads, and manure, which makes them productive of large crops of hay of a good quality; the mud is often carted out of them to mix with stock manure.

Q. 49. Is the growth of wood for timber and fuel equivalent to the consumption in your vicinity? if not, what measures are taken to provide against the inconveniences of future scarcity?

A. The growth is equal to the consumption.

Q. 50. Are wood lots generally fenced, or left open for cattle to range in without restraint? In getting your wood for fuel do you pick the oldest trees, or do you cut clear? Which method is best calculated to increase the value of your wood lands?

A. Wood lots, in this vicinity, are generally fenced, and it is thought most advisable to cut out the oldest trees, and such as have been broken by wind, or are decaying by accident; by that method a wood lot of thirty acres will supply a family with twenty cords of fuel, without diminishing its value—whereas, while we are cutting one part clear, there will be considerable annual loss in the other.

Q. 51. What are the causes that the culture of wheat can no longer be pursued on the sea coast of New England?

A. The blast upon wheat we suppose to be the reason why it cannot be cultivated near the eastern shore; on the south shore it is understood they cultivate wheat as formerly.

If strong east wind is the cause of blast, it may be thus accounted for, those winds being very powerful, and carrying their noxious qualities farther, as the country is laid open.

Q. 53. Is the European practice of a succession of crops found to be expedient in this country, and in what order ought such a succession of crops to take place?

A. In this vicinity a succession of crops is practised, but not so much because it is necessary, as it is convenient for want of sufficient manure for the whole ground.

Q. 54. Is it perfectly ascertained, that with attention to manuring the land, it is more advantageous to change the crops than to keep it in grass?

A. There can be no doubt, since plaster of Paris has been in use among us, that all land can be made with water, manure, and plaster, (some with one, and some with the other,) to yield grass so advantageously, that nine times out of ten it is better to keep even old fields to grass, than to plough them up.

Q. 55. Is there any crop so profitable as grass, taking into consideration the state of markets in our country, and the distance that most of our farmers are from market?

A. At the distance of thirty miles from the market, none so profitable as grass.

Q. 56. Can farmers raise any crop which, on the whole, affords them so great a profit as grass, unless they are within twenty miles of the capital?

A. Grass and feed afford the greatest profit, and with the least labour and expense, and when made into hay is more lucrative than a crop beyond the specified distance.

Q. 57. What are the most profitable crops which the state of Massachusetts, taking one year with another, furnishes?

A. Averaging the distance from the markets, and the difference of soil, the crops that are usually raised, such as grass corn, rye, barley, oats, and potatoes, &c. if the farmers are correct judges of their own interests, we must think to be the most profitable.

Q. 58. What has been found to be the difference of profit between the Merino sheep, and the sheep which formed our former stock?

A. We have not had sufficient knowledge of the clear Merino to give an answer—but the half Merino are thought to be double the profit of the sheep which formed our former stock.

Q. 59. Is there any cheap fodder which can be raised for sheep during the winter, which will supercede or diminish the consumption of hay?

A. There is none known in this vicinity.

Q. 60. What is the comparative profit of a farm adapted to the raising of sheep, between the cultivation of Merinos, and the aising of any other cattle.

A. We are unable, at present, to answer this question, as Merino sheep have not till lately been introduced in this to vicinity.

Q. 61. Is there any profit derived from the raising of Indian corn, except for the subsistence of man, which can equal the employment of the same land in raising grass for the support of sheep and cattle during the winter? What are the calculations on which such profits are founded?

A. It is not generally considered profitable in this vicinity to raise more corn than is necessary for making bread and fatting meat for family use.

Q. 62. What are the improvements in dairies, which have been made within the last twenty years? Is the quality of butter and cheese improved? and in what consists this improvement? and what are its causes?

A. There are none that we know of.

Q. 63. Are there any improvements in the tools of husbandry, which experience has confirmed, and what are these improvements?

A. None.

Q. 64. Are there any new and valuable fruits or productions, either contributing to the pleasure or profit of the citizens at large? What are they? What the mode of culture, and what their qualities?

A. None in this vicinity.

Q. 65. Are there any improvements in the breed of cattle? What are they, what their qualities, and where can they be obtained?

A. The breed of cattle kept in the New England states, and especially in this vicinity, have been greatly improved by selecting the likeliest heifers for breeders—to determine which much regard is had to the form and make of the animal: viz. such as are of a bright countenance, straight back, round ribbed, low and thick built: such coupled with bulls of the above description together with proper keeping, has not failed to produce stock, that for beauty or size has not been surpassed by any breed of cattle that has ever been introduced in this part of the country–there has within a few years been many oxen fatted in this vicinity, which weighed from 13 to 16, and some rising 17 hundreds a bullock.

Q. 66. Are there any other improvements, not comprised under the articles of manufactures which have been made in any branch of agriculture?

A. None that we know of.

At a stated meeting of the Shrewsbury United Agricultural Society held on the first Tuesday of November, A. D. 1813:—

VOTED, That the secretary of the Society be requested to transmit an attested copy of the foregoing answers to the several questions to which they are respectively attached, to the Massachusetts Society for promoting Agriculture.

True copy, *Attest,* U. HEMENWAY,
Secretary of S. U. A. S.

WEEDS.

INJURIOUS TO ARABLE LAND.

[Selected.]

COUCH is the proper name of the Triticum *Repens*, but is frequently applied to other grasses, which have a perennial creeping root; as the Bent Grasses, (Agrostis) Creeping soft Grass, (Holcus *Mollis,)* Tall Oat Grass, (Avena *Elatior)* and some others.

They are destroyed by repeated summer ploughings, or by forking them out and burning them.

Among Sharp's plates, containing figures of new invented implements of husbandry, is a jointed horse-rake for pulling up Couch-grass.

Colts'foot, (Tussilago *Farfara.)* The way to destroy this weed is by cutting it up in those months when it begins to throw its flower; at which time it will bleed to death.

Charlock is the Raphanus *Raphanistrum*, but the following plants, equally noxious to the farmer, pass under its name—viz. Wild Mustard, (Sinapis *Nigra,)* Wild Rape, (Brassica *Napus.)* These plants are annuals: their seeds will lie in a clod as safe as in a granary, and vegetate at the end of twenty years, when ploughed up and exposed to moisture.

They are to be extirpated by ploughing them under when the field is fallow, or by weeding them out of the crop before their seed shall have been ripened. The same method must be pursued with other weeds.

Melilot, (Trifolium *Melilot-Officinalis,)* White Darnel (Lolium *Temulentum,)* and Garlic, (Allium *Oleraceum,)* require particular care to destroy, as they not only injure a wheat crop when growing, but lessen its value at market, by communicating a most loathsome flavour to wheat and other grain, so as to render it unfit for making bread. Stinking Chamomile, (Anthemis *Cotula,)* where it abounds is often found to blister the hands of weeders and reapers.

Corn Marigold, (Chrysanthemum Segetum.) The noxious weed is said to be destroyed by dunging the soil where it grows, in autumn; letting it lie fallow one summer; and harrowing the ground in about five days after sowing the seed for the future crop—also by manuring with chalk.

Thistles, cut an inch above the ground, will not be so formidable at harvest as those cut at the same time with the hoe, and below the surface. In the former case, the remaining stub of the thistle gets filled with water, which resting upon the crown of the plant, injures it so far as to occasion a few feeble shoots only to rise; whilst in the latter, strong and luxuriant stools shoot forth.

If thistles, briers, &c. are cut with a mattock, or spade, in August, they will bleed to death.

Peat dust scattered upon thistles causes them to wither, as if scorched; but they generally recover unless the dust be repeated.

Berberry, (Berberis *Vulgaris.)* This shrub is said to have the quality of blighting the ears of wheat, even to the distance of three or four hundred yards across one or more fields.

Dodder or Hellweed, (cuscuta *Europæa.)* This is a very singular plant; as soon as it creeps up another it quits its root, and is fed by the plant on which it fastens, and its branches will thus run from one to another, a furlong or more. Hops, flax, and beans, are mostly attacked by it. The last is best freed from it by turning in sheep, which both break its branches and feed upon it.

Many weeds are generally introduced into fields by that slovenly practice of suffering them to grow and seed on the dung-heaps.

"One year's good weeding,
Will prevent seeding;
But one year's seeding,
Makes seven years' weeding."

WEEDS INJURIOUS TO CATTLE IN PASTURE LANDS.

Water Hemlock, (Phellandrium *Aquaticum,)* is generally esteemed a fatal poison to horses, occasioning them to become paralytic; but this effect is owing to an insect, (Curculio Paraplecticus,) which generally inhabits within the stem. The usual antidote is pig's dung; to oxen this plant is both wholesome and agreeable. Horses are said to have been killed by eating the common wormwood, (Artimisia Absinthium.)

Water Cowbane, (Cicuta *Virosa.)* Early in the spring when it grows in the water, cows often eat of it, and are killed by it; but as the summer advances, and its smell becomes stronger, they carefully avoid it.

Water Germander, (Teucrium *Scordium,) Blue Sowthistle* (Sonchus *Alpinus,) Treacle Mustard*, (Thlaspi *Arvense,)* and common Wormwood, (Artimisia *Absinthium,)* give a disagreeable odour to the milk of cows that feed on them; and corn mint, (Mentha *Arvensis,)* prevents its coagulation.

Wild Angelica, (Angelica *Sylvestris*,) renders hay ungrateful to cattle; and *Wall Barley Grass*, (Hordium *Murinum*,) when mixed in hay, proves highly injurious to horses, the awns or beards of the ears sticking into their mouths, and making them so sore that they are unable to eat.

Marsh Marigold, (Caltha *Palustris*,) occasions such an inflammation to cows that eat of it, that they generally die.

Common Lousewort, (Pedicularis *Sylvatica*.) If the healthiest flock of sheep are fed with it, they become scabby and scurfy in a short time; the wool gets loose, and they will be over-run with vermin.

Common Wormwood gives a bitter taste to the flesh of sheep that have eaten it; as does *Sun Spurge*, (Euphorbia *Helioscopia*.) One sort of Poppy, (Papaver,) and Mouse-ear Scorpion Grass, (Myosotis *Scorpioides*,) generally proves fatal to sheep.

Shepherds impute the rot to sheep feeding on the Round-leaved Sundew, (Drosera *Rotundifolia*,) Marsh Pennywort, (Hydrocotyle *Vulgaris*,) and common Butterwort, (Pinguicula *Vulgaris*,) all of which grow in marshy grounds. But from an experiment made on purpose with the last, it appeared they did not eat it. It may be made a question, whether the rot in sheep is so much owing to the vegetables in marshy grounds, as to a flat insect, called a *Fluke*, which is found in these wet situations, adhering to the plants, and likewise in the livers and biliary ducts of sheep, that are affected with the rot.

Cow Boletus, (Boletus *Bovinus*.) In cows and other cattle that have eaten of it, it has been known to create bloody urine, nauseous milk, swellings of the *abdomen*, inflammations in the bowels, stoppages, diarrhœas, and death. In sheep they bring on a scirrhous liver, cough, a general wasting, and dropsy.

For Mallows, Docks, and some other deep rooted plants, which, though perhaps not noxious to cattle, are seldom or never eaten, and take up the room of more useful plants, the docking iron should be made use of to eradicate them.

COMPARATIVE DURABILITY OF DIFFERENT KINDS OF TIMBER.

[Selected.]

STATE and condition of several kinds of timber, after being exposed to the weather ten years.

Cedar, perfectly sound.
Larch, heart sound, but the sap quite decayed.
Spruce-Fir, sound.
Silver-Fir, in decay.
Scotch-Fir, much decayed.
Pineaster, quite rotten.
Chesnut, perfectly sound.
White Poplar, sound.
Beech, sound.
Walnut, in decay.
Birch, quite rotten.

Green Fir timber may be seasoned, and rendered fit for immediate use, by soaking the planks or round trees, barked, a few days in lime water; or paying them over with lime along with water. Lime water is made by slacking the lime in water, and the hotter it is used, after the lime is slacked, the better.

Dry-Rot in timber may be prevented by charring the ends of the joints, and by fixing them in anchor smith's or foundry ashes, laid under the flooring. Leaving one of the boards of the floor loose, and removing it at night, is said to prevent it.

The Dry-Rot is owing to yellow Fungi, and to a white mould spread by a plant, resembling a vine or sea weed (Clavaria *Hypoxylon ?)*

Composition for preserving weather boarding; which is impenetrable to water, and is not injured by the action of the weather, or heat of the sun, which hardens it.

Three parts of air-slacked lime, two of wood ashes, and one of fine sand, or sea coal ashes; sift these through a fine sieve, and add as much linseed oil as will bring it to a consistence for working with a painter's brush; great care must be taken to

mix it perfectly—two coats are necessary; the first rather thin, the second as thick as can conveniently be worked.

Painting wood before the sap is dry, hastens its decay.

SEA WEEDS.

[Selected.]

Sea weeds are used as a manure, and are also converted into kelp by burning in a kiln. Kelp consists chiefly of the fixed vegetable alkali, in a pretty caustic state. It is used in the manufacture of glass, soap, and allum, and in bleaching of cloth.

The three numerous genera of Fucus, Ulva, and Conferva, are capable of affording kelp; but the four following plants produce the most; viz. Sea Oak, (*Fucus vesiculosus;*) Bell Wrack, (*F. nodosus;*) Serrated Wrack, (*F. serratus;*) and Tangle, (*F. digitatus.*)

It is observed of these plants: 1. That they are always of a quicker growth upon shores exposed to a current, than in more quiet water. 2. That the weeds which grow in currents afford a larger proportion of kelp, than those which grow in dead bays; and 3. That the weeds which grow where there is much fresh water, neither yield so much kelp as where the water is perfectly salt, nor of so good a quality.

The cultivation of *fuci*, upon shores, becoming an object of some consequence, it has therefore been recommended to cover the gravelly, sandy, or sleechy shores, expecially near the mark of ebb, with loose stones, from 2 to 300 pounds weight, or upwards, and not more than two feet distant from each other.

A beach, treated in this manner, will in four years, yield as good a crop as the natural shore.

They are cut from the rocks in the month of May, June, and July: and should be dried as quickly as possible, and burnt as soon as they are ready for the kiln.

SELECTION OF CATTLE FOR BREEDING.

[Selected.]

Is there any room to doubt that the profits of our dairies may be greatly augmented by proper attention to the breed of milch

cows? There is some prejudice on this point. It is said, good keeping makes good cows; yet those who say it, see in their own cow yards, very frequently, a single cow, not bigger nor better fed than the others, give a double quantity of milk. It is very careless and stupid to go on rearing the calves from poor cows in preference to those from good cows: yet this is pretty generally done, because the excellent cows bring excellent fat calves for market. Their good or bad qualities are doubtless hereditary, as well as their colour and size—at least in a very considerable degree. Why should we scruple this any more than the improvement of the breed of horses, which we prize for their blood? The bull is to be chosen with no less care than the cow. The best cows for milk may be raised as certainly as horses for racing or for draught—and in a dairy country, the total neglect of this important care is shameful and unaccountable.

As connected with the last point, it is to be known, whether the method of feeding cattle at a stack is not wasteful of the fodder, of the manure, injurious to the grassward, and to the cattle, by pinching their growth in wet and cold weather? On the other hand, whether our common cow houses are not too warm and close.

The leading idea that has governed Mr. BAKEWELL, in all his exertions, is to procure that breed of cattle which in a given quantity of food will give the most profitable meat—that in which the proportion of the useful meat to the quantity of offal is the greatest; also, in which the proportion of the best to the inferior joints is the greatest.

Therefore a great head, dewlap, or horns, or an over thick hide, are rather offal than meat.

On this plan, the points to attend to in a beast are those where the valuable joints lie; the rump, the hip, the back, the ribs, and after these the flanks, that is to say, the backward upper quarters; but the belly, shoulders, neck, legs, and head should be light; for if a beast has a disposition to fatten or be heavy in these, it will be found a deduction from the most valuable points. It has been said, but improperly, that a barrel on four short sticks would represent the true form; but that shape swells at the top and bottom, whereas the back of a beast should be square,

straight and flat, or, if any rising, it should be from a disposition to fatten and swell about the rump and hip bones—and the belly should likewise be quite straight, for if it swells it shews weight in a bad point.

He judges whether a beast has the right disposition to fatten, *by feeling*. He had rather depend on feeling only, than on seeing without feeling. In sheep, the hand only can tell whether the back is flat and broad, and free from a ridge in the back bone. There is a great difference in the feeling of lean bullocks; The hip bone should be covered with something under the skin that feels oily and soft—the same along the back bone and on the ribs with a good flank. In beasts that will not thrive well, there is nothing of this softness to be perceived, but the hide is tight and hard. There is indeed sometimes in such a frothy looseness, unlike the mellow feel. It is hard to describe this in words, but the graziers understand and practise it perfectly. Mr BAKEWELL pays no regard to crossing the breed—his own success shews it of no consequence whatever.

SHEEP.

The same rules of judging are applicable both to sheep and cattle.

The points to examine in a sheep and the general form of his carcass are the same as in an ox. The fatness and breadth of back, a spreading barrel carcass, with *flat* bellies, and by no means curved and hanging—with such a disposition to fatten as is indicated in the bulls and cows. In such the fat goes into the meat, instead of making tallow. He would have the fat not run to tallow, and all the offal, as the head, pluck, hoofs and bones, very small—his own breed are remarkably so. He keeps in pickle a neck of his own mutton, which is four inches and an half thick with fat on the bone.

One of his sheep was killed, weighing 46lbs. a quarter; it cut six inches of fat between the tail and the loin, along the back three inches, and at the division of the quarters through the ribs, six inches and a quarter—yet his sheep are usually of a moderate size. It is the shape nnd disposition to fatten that makes them so heavy. Let the food be what it may, they will

eat less and fatten more than any other breeds of sheep. It is by these principles that Mr. BAKEWELL has gradually formed his breed by selections.

The kind of cattle that were most esteemed before Mr. BAKEWELL'S day, were the large, long bodied, big boned, coarse, gummy, flat sided kind. This discerning breeder on the contrary introduced a small, clean boned, round, short carcased, kindly looking cattle, and inclined to be fat—and it is a fact, that these will both eat less food in proportion, and make themselves sooner fat than the others—they will in truth pay more for their meat than any other sort in a given time.

DYERS' WOAD.

DESCRIPTION AND MANNER OF CULTIVATION.

[Miller's Gardener's Dictionary.]

THE common Woad, *(Isatis Tinctoria,)* is a biennial plant, with a fusiform, fibrous root. Stem upright, round, smooth, woody at bottom, branched at top. Root-leaves ovate lanceolate, on long foot-stalks, down which they run a little. Stem-leaves alternate, quite entire, embracing, smooth, from two to three inches long, and scarcely half an inch in breadth. These are sometimes very slightly toothletted; and a few hairs are sometimes found both on the stem and leaves. Flowers small, terminating the stem and branches in a close raceme. Both corolla and calyx yellow; petals notched at the end. Seed vessels on slender peduncles, hanging down. Chesnut coloured or dark brown and shining when ripe, of an oblong elliptic form, near half an inch long and two lines wide, compressed at top and on the sides into a sharp edge, swelling like a convex lens in the middle, with a straight longitudinal suture on each side, one celled, two valved, but hardly opening spontaneously: vales of spongy substance like cork, and boat-shaped.

Seed smooth, striated a little, two lines long, and three quarters of a line wide, yellow or brownish yellow when ripe; it has only a single membranaceous coat. Embryo curved, yellowish. Cotyledons ovate, fleshy, plano-convex.

Mr. Miller thus describes the cultivated plant, which however differs little from the wild one except in luxuriance. The lower leaves are of an oblong oval figure, and pretty thick consistence, when growing in a proper soil; they are narrow at their base, but broad above, and end in obtuse roundish points; are entire on their edges, and of a lucid green. The stalks rise near four feet high, dividing into several branches, with arrow-shaped leaves sitting close; the ends of the branches are terminated by small yellow flowers, in very close clusters. The pods are shaped like a bird's tongue, half an inch long, and one eighth of an inch broad, turning black when ripe. It flowers in July, and the seeds ripen the beginning of September.

According to Linneus, Woad is a maritime plant. It is a native of several parts of Europe; it is found on the coasts of the Baltic and near the Ocean. It is also found by the way-sides in Switzerland.

A fine blue colour is obtained from Woad. It is also the basis of black and many other colours.

As the goodness of Woad consists in the size and fatness of the leaves, the only method to obtain this is to sow the seed upon ground at a proper season, and allow the plants proper room to grow, as also to keep them clear from weeds. The method practised by some of the most skilful kitchen gardeners in the culture of spinach, would be a great improvement to this plant, for some of them have improved the round-leaved spinach so much by culture, as to have the leaves more than six times the size they were formerly; and their fatness has been in the same proportion, upon the same land, which has been effected by thinning the plants when young, and keeping the ground constantly free from weeds.

A hazel loam, whose parts will easily separate, is the best soil for Woad. The ground should be ploughed and laid in narrow high ridges just before winter;—it should be ploughed again in the spring; a third time in June, and lastly toward the end of July or early in August. In the intervals between each ploughing, it will be necessary to harrow the soil, so that all weeds may be destroyed.

Woad is sown in England early in August, and generally broad-cast, though the drill husbandry is the most advanta-

geous. At the end of two or three weeks, the plants must be hoed, at the distance of at least six inches; after which they will require no further attention except a careful weeding in October, and particularly in the month of March.

The proper time for gathering the leaves is determined by their full growth, and the first change of colour at their points; they are cut with an edged tool, and collected into baskets by women and children. If the land be good three or four successive crops may be taken; but the two first are the finest. After the leaves are gathered they are submitted to the action of mills, similar to those employed for grinding oak bark; and in which they are reduced to a kind of pulp. The Woad is then laid in small heaps which are closely and smoothly pressed down. As often as the crust formed on the outside cracks or breaks it is again closed, in order to preserve the colouring matter. In this state it remains for a fortnight; at the expiration of which the heaps are broken up; the external part is worked into a mass, and the whole is formed into oval balls, either by the hand or by means of moulds; the balls are now exposed to the sun under shelter; when perfectly dry they are ready for sale. Such is the process which Woad undergoes before it becomes fit for dying *blue* colours. But Mr. Astrue is of opinion, that if this vegetable were cured in the same manner as indigo, it would produce a colour of equal lustre to that obtained from such an expensive drug. DAMBOURNEY directs to boil the fresh leaves of Woad with diluted bullock's blood, or more effectually with caustic soap-boiler's lye; in this simple manner a dark green decoction of a bluish shade will be obtained; and after clarifying the liquor, it will form a blue precipitate; which, dissolved in oil of vitriol, and properly diluted, imparts a beautiful colour to woollen cloth. Farther, even the leaves, in a state of fermentation, with pure water on adding a small portion of caustic alkaline lye, afford a fine blue sediment resembling the true indigo. [This useful article abounds in the western states, and also in Pennsylvania, according to the report of an experienced native of Britain, who is settled near the head of Ohio, in Washington County, Pennsylvania. It appears that the farina is much richer than that in England; and that instead of two crops, which are obtained in England, five are yielded in the United States.]

DYER'S MADDER DESCRIBED—MODE OF CULTIVATION IN HOLLAND.

[From Miller's Gardener's Dictionary.]

DYER'S madder, *(Rubia Tinctorum,)* has a perennial root, and an annual stalk. The root is composed of many long, thick, succulent fibres, almost as large as a man's little finger; these are joined at the top in a head, like the roots of asparagus, and strike very deep into the ground, being sometimes more than three feet in length. From the upper part, (or head of the root,) come out many side roots, which extend just under the surface of the ground to a great distance, whereby it propagates very fast; for these send up a great number of shoots, which, if carefully taken off in the spring, soon after they are above ground, become so many plants. These roots are of a dark colour on their outside, somewhat transparent, and have a yellowish red pith in the middle, which is tough, and of a bitterish taste; from the root arise many large, four-cornered, jointed stalks, which in good land will grow five or six feet long, and, if supported, sometimes seven or eight; they are armed with short herbaceous prickles, and at each joint are placed five or six spear-shaped leaves, about three inches long, and near one broad in the middle, drawing to a point at each end; their upper surfaces are smooth, but their mid ribs on the under side are armed with rough herbaceous spines; the leaves sit close to the branches in whorls. From the joints of the stalk come out the branches, which sustain the flowers; they are placed by pairs opposite, each pair crossing the other; these have a few small leaves towards the bottom, which are by threes, and upward by pairs opposite; the branches are terminated by loose branching spikes of yellow flowers, which are cut into four segments resembling stars. These appear in June.

[Leaves four, five, or six. Flowers four, five, or six cleft. Native of the south of Europe, the Levant, and Africa.]

It is well known that madder is so essential to dyers and calico-printers, that neither business can be carried on without

it. The consumption of it is so great in England, that, upon a moderate computation, more than one hundred and eighty thousand pounds sterling is annually paid for what is imported from Holland.

Madder requires a loamy, substantial soil, not too stiff and heavy, nor over light and sandy. The land which is designed for madder, if strong and heavy, is ploughed twice in autumn, that the frost in winter may mellow it and break the clods; then it is ploughed again in the spring, just before the time of planting. But if the ground is light, twice ploughing in the spring is sufficient. The land is then divided into beds about three feet broad, with a space between, for the convenience of weeding with ease. Madder is raised from the slip, and very rarely from the seed. The time for planting is about the latter end of April, when the young shoots are taken off from the mother plant, from the sides of the root, (they are at this time about two inches above ground,) with as much root as possible; and planted in rows about one foot asunder, and commonly four in a row.

The first year it is customary to plant cabbages or dwarf kidney beans in the furrows between the beds, but this practice has been found by experience injurious to the growth of the plant; care should be taken to keep the ground entirely free from weeds.

In September or October when the young madder is cleaned for the last time that season, the stalks of the plants are carefully spread down over the beds, without cutting any part off, and in the month of November covered over with three or four inches of earth.

In the spring of the second year, when the young shoots begin to come out, the earth on the top of the beds should be scuffled over and raked to destroy the young weeds, and make the surface smooth and mellow, that the shoots may push out with the more ease.

The second summer, there must be the same care taken to keep the madder clean as in the first, and nothing should be planted or suffered to grow amongst it.

At the last time of cleaning the ground in September or October the green stalks are again spread down upon the beds,

and in November they are again covered with earth in the same manner as the first year.

By this method of culture one can see how necessary it is to plant the madder in beds, for thereby it is much easier covered with the earth of the furrows; and the earth of the beds is every time raised, whereby the madder roots will be greatly lengthened, and the young shoots will have longer necks, and by being thus deeply earthed, will put out more fibres, and have much better roots, without which they will not grow; and it is of equal use to the mother plants; for by this method the roots will be longer; and in this consists the goodness and beauty of the madder, for those which have only a few main roots, are not so much esteemed as those which are furnished with side roots.

The madder roots are seldom dug up the second year, but generally after they have grown three summers, therefore the culture of the third year is the same as in the second, during the spring and summer.

The madder roots are usually dug up in Holland about the first of September, or when the stalks begin to decay in the third year. The more bitter the taste of the roots when taken out of the ground, before they are brought to the stove, the less they will loose of their weight in drying, and the better they are afterwards for use.

There have been some ignorant persons, who have advised the cutting off the stalks in summer, in order to strengthen the roots; but whoever practises this, will find to their cost the absurdity of this method; for I have fully tried this many years ago, and have always found that every other root upon which this was practised, was at least a third part smaller than the intermediate roots, whose stalks were left entire. The first occasion of my making this experiment was because the plants had been set too near each other, and the season proving moist had increased the number and strength of the shoots, so that they were so thick as that many of them began to rot; to prevent which I cut off the shoots of every other plant, to give room for spreading the others thinner, but soon after this was done the plants produced a greater number of shoots than before, but they were weaker, and the effect it had upon the roots

was as before related; since which time I have frequently repeated the experiment upon a few roots, and have always found the effect the same.

When the season for digging up the madder root is come, it should be done in the following manner, viz. a deep trench should be dug out at one side of the ground next to the first row of madder, to make a sufficient opening to receive the earth, which must be laid therein in digging up the row of roots, so that it should be at least two feet broad, and two spits and two shovellings deep, and should be made as close as possible to the roots, being careful not to break or cut the roots in doing it; then the row of roots must be carefully dug up, turning the earth into the trench before-mentioned. In doing this there should be persons to pick out the small fibres remaining below, after the principal roots are taken up; in order to get the roots as clean as possible, the whole spot of ground should be dug of the same depth as the first trench, and the pickers must follow the diggers to get them all out to the bottom. The digging of the land to this depth is a fine preparation for any succeeding crop.

After the roots are taken up, the sooner they are carried to the place of drying, the finer will be their colour; for if they lie in heaps they are apt to heat, which will discolour them; or if rain should happen to wet them much it will have the same effect, therefore no more roots shall be taken up than can be carried under shelter the same day.

The first place in which the roots are laid to dry must be open on the sides to admit the air, but covered on the top to keep out the wet. If a building is to be erected new, such as the tanners have for drying their skins will be as proper as any, for these have weather boards from top to bottom at equal distances to keep out the driving rain, but the spaces between being open admit the air freely; and if instead of plank floors or stages above each other, they are laid with hurdles or basket-work, upon which the roots are laid to dry, the air will have freer passage to the under side of the roots, which will dry them more equally. In this place they may remain four or five days, by which time the earth which adhered to the roots will be so dry as easily to rub off, which should be done before the

roots are removed to the cold stove; for the slower the roots are dried, the less they will shrink, and the better will be the colour of the madder; and the cleaner the roots are from earth, the better the commodity will be for use when prepared.

After the roots have lain a sufficient time in this place, they should be removed into another building, called the cold stove; in which there should be conveniences of flues passing through different parts of the floor, and the side walls; in this the roots should be laid thin upon the floors, and turned from time to time as they dry, taking those roots away which are nearest to the flues which convey the greatest heat, placing them in a cooler part of the room, and removing such of them as had been in that situation to the warmer, from whence the others are taken. Constant care in this particular will be of great service to the quality of the madder; for when this is properly conducted, the roots will be more equally dried, and the commodity, when manufactured, will be much fairer and better for use.

When the outside of the roots has been sufficiently dried in this cold stove, they should be removed to the threshing floor, which may be the same as a common barn where corn is threshed. The roots should then be threshed, to beat off their outside coverings; this is the part which is prepared separately from the inner part of the root, and is called *mull*, which is sold at a very low price, being the worst sort of madder, so cannot be used where the beauty or permanency of the colours is regarded. These husks are separated from the roots, and pounded by themselves, and afterwards packed up in separate casks.

After the mull is separated, the roots must be removed to a warmer stove, and dried with care, for if the heat is too great they will dry too fast, whereby they will lose much in weight, and the colour of the madder will not be near so bright; to avoid which the roots should be frequently turned, and the fires properly regulated.

When the roots are properly dried in this stove they must be carried to the pounding house, where they must be reduced to powder.

In Holland when it is pounded about a third part, it is sifted, and the powder, which consists of the thinest and smallest roots, and the remainder of the outside husks, and some dirt which could not be separated by drying and threshing, is placed in a separate cask, and is of inferior quality to the powder from the second pounding, or what is yielded by the remainder of the roots, and which bears a higher price.

LICE INFESTING YOUNG ORCHARDS IN THE DISTRICT OF MAINE—MODE OF DESTROYING THEM.

[Letter from E. Perley, Esq. formerly published by the Trustees.]

THIS insect, called *lice*, is in form like half a kernel of rye, (but not more than one twentieth part so large,) with the flat side sticking to the smooth bark of the tree. They resemble blisters; and are near the colour of the bark of the tree. These blisters contain from ten to thirty nits or eggs each, in form like a snake's egg; which, in a common season, begin to hatch about the 25th of May, and finish about the 10th of June. These nits produce a white animalcule, resembling a louse, so small, they are hardly perceptible by the naked eye; which, immediately after they are hatched, open a passage at the *end* of the blister, and crawl out on the bark of the tree; and there remain, with but little motion, about ten days; when they stick themselves fast to the bark of the tree, and die. From this little carcass arises a small speck of BLUE MOULD, which is most plain to be seen between the 10th and 20th of June, and continues about fifteen days; and then gradually wears off, until the old carcass appears, which by this time is formed into a new blister, and contains the spawns or nits before mentioned.

These blisters prevent the circulation of sap; and prove as fatal to the tree as the canker worm.

In order to remedy the difficulty, I have made many experiments within a few years; but long to no good effect, not knowing then the particular season when these animalcules could be most easily destroyed. This, however, I have lately found to be between the time they hatch, and that when the

mould leaves them.* The application that I have found most effectual is, washing the tree with lye, or brine. Lime also, mixed with lye to the consistency of whitewash, may be useful. And although the *small* branches cannot be cleansed in this manner without much difficulty, still if the body of the tree and the branches near the body are kept clean, until there comes a *rough* bark, I think the lice will not kill *the tree.*

Some people have recommended the application of *train oil* to the tree, which indeed is a powerful antidote against lice; but being of a glutinous quality, is very detrimental to the tree. *Inoculation* has been proposed; which I think will have no effect at all on the lice; for I perceive they hatch in May, on branches that were pruned off the tree in March, and the sap entirely extinguished.

These lice are natural in the *uncultivated* forest, on what is called moose-wood and other bushes.

Much care should be taken on their first appearing in an orchard or nursery; as the cutting down and destroying a few young trees is of no importance, compared with the difficulty of having an orchard overrun with them, &c.

P. S. The brine or pickle, with which the tree is to be washed, should not be such as has had meat salted in it; but let one quart of common salt be dissolved in two gallons of clean water.

MEMOIR ON THE MANAGEMENT OF BEES.

BY REV. THOMAS NOYES OF NEEDHAM.

THE trustees have received and read with interest and pleasure the observations of Mr. Noyes. They have examined attentively his model for hives, and on the whole are inclined to give it the preference to any which they have seen described, provided

* It appears from this account, by Mr. Perley, that these appearances can, in general, only occur between May 25 and July 5.

they shall turn out to be as useful in the hands of other persons, as in those of Mr. Noyes, who is undoubtedly a very observing and skilful manager of bees.

The management of bees is an important branch of agriculture, and has so been considered in all ages. Few branches yield so much profit and so innocent a luxury at so little expense of money or time.

We have taken the liberty to abbreviate Mr. Noyes's essay, because, important as the subject is, we had not room in the present Number for the whole, and we thought it better to abbreviate than to divide it; as in the latter case, many might see one part who might never read the other. We understood also that he very modestly and kindly permitted us to take the freedom to shorten it if we should find it necessary.

It became the more important to do it, inasmuch as it was absolutely necessary that we should precede it by some remarks. If, as we are informed, and indeed the memoir itself bears internal evidence of it, the observations of Mr. Noyes were solely the result of his own attention and experience, unassisted by the great lights which have been thrown upon this subject by the German, French, and English writers, he is certainly a very indefatigable and ingenious man, and we cannot but regret that he had not enjoyed the benefit of these deep researches of European naturalists on this curious insect; as it is probable he might have either confirmed by new discoveries and remarks their histories and theories, or perhaps have thrown some new light upon the subject of the natural history of the Bee. It would not however have been proper for this Society to have published the remarks of Mr. Noyes without adverting to the very extensive researches lately made on this subject in Europe.

It might have implied an indisposition to give to the Europeans the credit due to them, or such a neglect on our part might have been added to the many censurable cases, in which some of our citizens have been ready to appropriate to themselves the labors of Europeans. It assuredly does not in any degree diminish Mr. Noyes's merit, (who most certainly never has had the means of obtaining this information,) to say that Europeans have preceded him in the same field of useful inquiry;

nor is it any sort of discredit to him that he has not read these works, because it is well known, that the stipends of our excellent clergy in country villages will not permit them to lay out 200 dollars for Dobson or Rees' Encyclopedia, or half that sum for the Abbé Rosier's Cours d'Agriculture, from which our knowledge on this subject is derived.

Mr. Noyes has not gone into the abstruser parts of the natural history of this insect, such as the sexes, the mode of generation, the anatomical conformation of the insect. These subjects have been fully discussed by Swaunnerdam, Reaumur, Scheiac, and Bonnet. It is a curious and interesting topic and is most clearly and satisfactorily discussed in Rosier's abovementioned work, title, " Abeilles."

As so few of our fellow citizens in the country have an opportunity of seeing these expensive works, we think we shall abridge this article in our next number, which will render it unnecessary to make any other remarks before we introduce Mr. Noyes to our readers, except that following Virgil, Mr. Noyes seems to consider the monarch of the bees *a male*. There is no point more clearly settled than that the monarch is a female, and the mother of the whole new swarm or progeny. There is but one female suffered to remain in a hive. We shall not here enter into many other curious facts as to the mode of treatment of her and of supplying her place when she dies or is taken away. We shall leave that till we abridge the article above alluded to.

Wildman, an English cultivator, and half a score of French gentlemen, have exercised their ingenuity in inventing different forms of hives, all having the same object, the procuring of a part of the honey without adopting the wasteful, and unnecessary, and painful expedient of destroying the bees.

Mr. Noyes had the same object in view. It will be seen, we think, when we shall give an account of the other sorts of hives, proposed by the European cultivators, that Mr. Noyes' are entitled to a preference to any which have been described in the work above mentioned.

We now proceed to an abridgment of Mr. Noyes's memoir.

ON THE MANAGEMENT OF BEES.

EVERY one in a republic is bound to render himself useful in some way to society; either by his industry, instructions, or example; or by all these united. Influenced by a desire of being useful, I am induced to make the following communication to the honorable *Trustees of the Massachusetts Society for promoting Agriculture;* but how far I shall succeed in advancing the public or agricultural interest, I shall leave for you, gentlemen, to determine.

From early life my attention has been attracted by that well known insect, the bee. Influenced by a principle of humanity and interest, I have, for several years past, been led to make some experiments in the management of these industrious and profitable insects, with a view to find an easy and safe *substitute* for the barbarous practice of exterminating them, in order to enjoy the fruits of their industry.

I have now the satisfaction to state from actual experiment, a simple and safe process, which I have adopted, of making my bees pay an annual tribute, without waging an exterminating war upon them. In order to effect this, I find it necessary to construct my hives very differently from what has been the general plan of their formation. I have substituted boxes, and give each swarm two, three, or four, boxes, as I find their situation requires. Their introduction from one box to another is easy, and the removal of either of the boxes is safe and practicable, at any season of the year, or in the middle of the day, when they are the most active. With very little injury to them, I can take their hive into as many parts as it consists of boxes; put it together in the same, or different order; take which box I please; avail myself of its contents, without injuring the bees; give them another box, or return the same empty; place it at the top, bottom, or centre, at pleasure. And in this way, make them more industrious, by affording them constant employment, and completely remedy their necessity for idleness, which is sometimes the case, when they have filled their hives, and have no where to bestow their goods.

To prove the practicability of what I have suggested, I shall be particular in describing the dimensions and structure of the

hive, which I use; the method of introducing the bees into it; the process of increasing or diminishing the number of boxes, without having a host of assailants around me; and some general observations relative to the attention they require.

The boxes, which I use, are constructed in the following manner. I take a clean inch board, six inches wide, and saw it into pieces fifteen inches long. Four of these pieces, when put together at right angles, will form the four sides of a box, whose dimension within will be fourteen inches square and six inches deep. At the centre of the bottom of that side which I design for the front, I make, for a door or passage for the bees, an opening, one and an half inch long, and one third of an inch deep. Then cover the top and bottom with pieces of boards, whose thickness does not exceed one sixth or one eighth of an inch. These covers ought to project in the front about one inch to accommodate the bees with a place or stage, on which they may alight and rest. They serve as partitions between the boxes and the lower cover ought to be confined with small screws, that it may be easily removed, when the honey is to be taken from the box. The door or passage for the bees being already made, I proceed to open a large hole for the purpose of introducing the bees into the box, and as a communication from one box to another. For this purpose I cut two holes, between three and four inches square, through the centre of the two thin covers. Having all my boxes made in the same form, and size; with holes corresponding when placed one above another; it is immaterial which is used for the top, bottom, or centre one, as in every position there will be a correspondence and uniformity.

The top box is always to be covered with a board not less in its dimensions, than the top surface of the hive; with a weight upon it to keep it in its place and prevent its warping. By having these partitions thin, the bees in each box come nearer in contact; and by having the boxes so completely closed, united only by a communication in the centre, they can be separated by a very little brakage of the comb and honey, as all the cells are parallel with the surface of the boxes; and in separating them, they are cut horizontally and not transversely.

When my bees swarm, and having alighted on some branch of

a tree, and become quiet, I am generally ready to receive them; but am careful to introduce them into a clean box, which is prepared by faithfully rubbing the inside with the leaves of sweet balm, walnut, hazelnut, or balm of gilead; moistened in a strong brine, made by the solution of clean salt. Having prepared two boxes in this way for their reception, I place a clean table in the shade; and with a knife or saw cut off the branch on which the bees have alighted, and place them on the table, and having united two boxes, place the hole in the lower box directly over the centre of the bees; with care that it does not press so hard as to injure them. They generally indicate by their movement that they know what is designed, and take possession of their new habitation. If they do not immediately retire to their provided tenement, I take a small branch of a tree that is clothed with leaves, and gently thrust it in among them, and they will leave the branch of which they first took possession, and retreat into the box for protection without offering to resent any want of civility towards them. I gradually lower the box as they retire into it, till it comes in contact with the table, and leaves them no communication to pass out of the box, but the door.

If my bees light on the trunk of a tree, or on a branch that is too unwieldy to move, or too valuable to be cut, I set a table under them. If they are high, I suspend a table between too ladders, put my boxes on it, elevated a little so as to give them a passage between the lower box and the table; and with a clean wing or something that is soft, brush the bees in direction of the table, and they will not fail to take possession of the tenement provided for their reception. Proceeding in this way, I meet with no difficulty in introducing my bees into my new constructed hives. The bees ought to be removed as soon as they are quiet, to the place where they are to remain, before they go abroad, or at evening when all are in their habitation; or else many of them will be lost, and never again join the swarm. In hiving and moving the bees, particular care ought to be taken not to irritate, or injure them by wounding or killing them.

Bees require particular attention during the season in which they usually swarm; and at every season, they ought to be secured from the wet; and kept remote from swine, geese, and

fowls, that no disagreeable stench arise from any thing among them. Their house ought to be so constructed and situated, that the rising sun may animate them to early industry, and at the same time shield them from his meridian beams, during the warmest of the season, for too much heat is unfriendly to their comfort and activity. When the season is nearly past for collecting honey, the doors of their hive must be contracted, to enable them better to defend themselves against invaders. When the resources of nature fail, they sometimes invade other hives with a view to make conquest; but in doing this, they do not unfrequently attack a late swarm, that has not a sufficient store of provision to preserve them through the winter. In this case their conquest seems to be humane, for they receive the vanquished into their own dominions, and incorporate them with all the privileges of their own subjects.

By contracting the aperture of the hive in the autumn, the bees can not only easier defend their territories against their enemies, but their hive will be rendered more comfortable for winter. The extremes, cold and heat, are unfavourable to the prosperity of bees.* Before cold weather commences enclose the hives on every side, except the front, with straw to defend them from the snow and piercing cold. In the month of February when the weather is moderate, the bees will leave their hive, and many of them light on the snow, and unless straw be spread in front of the hive on the snow, many of them will never rise again. They will soon chill and die, unless they find something, by which they may crawl from the snow, and so rise and return to the hive. It will be necessary to spread straw every new snow, or else their numbers will be greatly diminished by chilling and dying on the snow in front of the hive.

The process of diminishing or increasing the number of boxes, is both simple, easy and safe. In collecting their tribute, or enlarging their habitation, two things I carefully observe; one is not to kill or wound them; the other is to put it out of their power to injure me. For this purpose, if it be in the morning before they have left their habitation, I close the

* "nam frigore mella
Cogit hiems, eademque calor liquefacta remittit:
Utraque vis apibus pariter metuenda:" Virgil Georgica lib. iv.

door upon them, and confine them at home. If it be in the middle of the day, when they are active, I approach them with the smoke, that arises from burning leather, which has the best effect. This will make them retreat into their hive at any time, or leave the branch or trunk of a tree when hiving them, should they attempt to regain the place they, at first, occupied, after being brushed off. Besides, by this act of fumigation another important advantage results. It will disarm them of all resentment, and render them harmless. Whenever they assume a hostile attitude, in hiving them, I first fumigate them, and they are immediately transformed into peaceful subjects, and my reception is friendly. But to return to the process of collecting their tribute.

I have already observed that the bees are confined in the hive. Supposing the hive to consist of three boxes, and I wish to avail myself of the honey in the middle box. I approach them with four sheets of tin, or slides made of a board one eighth of an inch thick, twelve inches wide, and eighteen inches long—made sharp at one end, and the other secured by a narrow piece of board to prevent its warping and as a handle to the slide. I raise the upper box in front a little, and insert one of the slides, which cuts off all communication between the two upper boxes; then insert another slide directly under the first. This being done, take the top box off, lifting it by the upper slide, which will prevent the bees escaping out of the top box, and the other slide remaining on the top of the second will confine them in the other boxes. I then insert two more slides between the two remaining boxes, in the same manner, and the hive is prepared to be separated into three parts. I then raise the middle box by lifting it by the slide immediately under it, carry it a little distance from the others, place it on a little carriage made with four low wheels or trundles, simply connecting the two axles by two side pieces, of such dimensions as to receive the box and confine it, when the carriage is in motion. Then put the two remaining boxes together, insert an empty one in the middle or on the top; remove the slides, let the boxes come in contact; open the doors and give them their liberty. Remove the slides from the box on the carriage, stand at a distance and draw it by a cord; and the gentle motion will

not break the comb, but will cause the bees to come out and return to the hive, for they will not long pursue the box that is continually receding from them. In this way, I have taken a box of honey in the middle of the day without injury, when the bees are the most active, and most susceptible of resentment. The process of removing the top or bottom box, requires but two slides, and is much more simple, and does not render it necessary to cut off the communication between the two remaining boxes.

In putting in the slides, the boxes must not be raised so high as to have the bees escape; and in selecting a box, if the one that contains the monarch of the kingdom be taken, the bees will not so willingly relinquish their habitation, unless he take his departure from it. They will appear to be unwilling to leave him without some attendants. Experience has convinced me of this. I removed a box last July, from the hive which was filled with the choicest honey; but on removing the honey from the box, I found at one corner of it about forty or fifty bees collected together, and they appeared unwilling to separate, yet as harmless as though they possessed no weapon of defence. I suspected that the monarch was a prisoner—With a spoon I took out the bees and soon found evidence to confirm my supposition. The monarchs of these well regulated kingdoms, I had, in several instances before, been favoured with opportunities to inspect. I found that he was much longer than the other bees. His wings were of a lighter hue, and the rest of him much darker colour. His motions were nimble, and he displayed an activity not common to his subjects. After having inspected him to my own satisfaction, and exhibited him to the view of my family, I returned him safe to his own dominions. In doing this I placed him several inches from the door of the hive to ascertain whether any particular attention would be paid their sovereign on his return. To my astonishment, I beheld several bees crawl to him, and with evident marks of joy and congratulation, attended him to the hive.

I shall now attempt a numerical statement of the advantages, which result from the method proposed of managing these industrious insects, superior to that which is generally practised.

First. It contributes to their preservation. Bees are prof-

itable insects. They richly reward us for all our attention to them, and whatever they collect that is useful and pleasant, adds so much to the real wealth of the community; for the sweets they extract would evaporate in the air, or decline with the fading blossoms. Surely then, we have motives, arising from interest to spare and protect the industrious bee, whose honey is not only grateful to the taste, pleasant and wholesome for food, but highly valuable in a medicinal view; and whose wax, when extracted from the comb, is valuable for light, is almost indispensable in some arts, and is highly beneficial in medicine.*

Secondly. Another advantage arising from my method of managing bees, is, that you can draw from the hive what is more than necessary to supply them during the winter. Instead of leaving them honey to remain in their cells year after year in a candied state, you may take *annually* what you deem superfluous. Besides if you find there is a deficiency in some of your hives, and you are apprehensive their stock of provision will not supply them through the season, in which they cannot find resources abroad, you may give them a box of honey from a hive that can spare it; and, in this way, make up the deficiency of one hive from the redundance of another.

Thirdly. A small swarm of bees put into a larger hive than they can fill, appear to be discouraged, and will not be so industrious, as they would be, were they put into a single box, and then another added, when their situation should require it.

Bees put into a larger hive than they can fill in the season, will not keep so warm in the winter; and should they fall down when the weather is cold, which is often the case, they would be likely to chill and become inactive, and so be unable to re-

* The generality of mankind appear not to be sensible how much they are indebted to this insect for many of their comforts and luxuries, in the ample supply of the various kinds of fruit to regale them. I believe it is well ascertained, that unless the bee or other insects visited the flowers, the whole class of vines, fruit trees, and many culinary plants would be unproductive. There evidently appears to be two kinds of blossoms, which may be distinguished by the terms, male and female. Insects, by visiting both the male and female flowers, convey the ferina, or subtle particles to the stigma, which impregnates the flower, and thus it is rendered fruitful.

gain the place they left. The comb not extending to the bottom of the hive would not afford them a conductor to reascend; they would be under the necessity of climbing by the surface of the hive. It is a fact that a hive of bees, thus situated, generally lose double the number of bees, during the winter, that a swarm does, whose comb affords them a conductor to reascend when they meet with this misfortune. Besides, the bees have further to travel after entering the hive to reach the repository of their treasures, for they carefully avoid that confusion which flying would create in the hive. Neither can the bees work to so good advantage in a large hive, as they can in one that is smaller. I find from several years' inspecting them, through glass windows, and the hole at the top of the upper box, that they always keep in the hive bees enough to cover the surface of their work, in order to keep their wax warm enough to mould it into their sexangular cells; besides a number of bees are generally employed as a chain for the others to ascend and descend. In a large hive, the surface of their work is more extensive, than it would be in a small one. The consequence is, more bees must be kept at home, and a less number spared to collect the sweet vegetable juice, or other necessary materials to enrich and adorn their hive. Neither can the bees so effectually defend themselves against the attacks of lawless invaders, when their residence is so remote from the entrance of their camp.

Fourthly. Honey deposited in boxes is not so liable to melt, waste, and destroy the lives of no inconsiderable proportion of the bees, as that which is laid up in large hives. The comb in large hives is suspended from the top, and forms a contact by the sides, and does not rest on the bottom, even when the bees have filled the hive as full as they ever do. They leave room to pass under the comb. Long and wide pieces of comb filled with honey, supporting many bees, suspended, when the weather is warm, become tender, separate and fall. The position of the comb being changed, the honey attenuated by heat, the sexangular cells discharge the sweet, glutinous liquor, and the bees, chained in the rich melliferous flood, are borne away in death by the materials they collected to preserve life. Whereas, honey deposited in boxes seems not to be subject to this misfortune,

The comb is constructed in flakes, supported at the top, sides, and bottom generally, except the lower box, or the first they occupy, by short legs or braces, in order that the bees may encircle it on every side; and the pieces being small, there is not that pressure or stress of weight; it retains its position, and consequently the honey does not burst from the comb when the weather is warm.

Fifthly. Anther advantage resulting from having honey deposited in boxes, is that it may be taken out of them, without breaking the honey in any considerable degree. I took from a box in the month of July last thirty pounds of honey-comb, and several pieces, from one to four pounds each, without uncapping one cell. The honey was transparent and completely closed, nor was there a single cell in the whole box, but what was filled with the delicious fluid. It was superior to any that I ever saw taken from large hives; and if kept cool, to all probability, it might be preserved months or years unbroken in the comb. Besides, the method, which I have proposed, affords an opportunity of taking honey before the bees collect any from the flowers of buck-wheat, which honey is far inferior in flavour and delicacy, to that which is collected earlier in the season.*

Sixthly. The usual time to take up bees is in the autumn, but I do not confine myself to that season. My method of managing bees will admit of taking honey from them any time when they have it to spare; but in selecting a box, care must be taken to avoid that which contains the young bees. The object of the new colony is to add to their strength by increasing their numbers; consequently their early attention is directed to provide cells to deposit their eggs. The lower box, which they first enter, becomes the place of their residence, till they have filled it with comb and young bees, if it be an early swarm. The honey is to be sought in the second box, of which they gradually take possession. In filling the second box they begin at the communication between the two boxes, and raise

* Honey, collected from buck-wheat flowers, will do to preserve the bees, but it is several shades darker in its colour, less sweet in its nature, possessing something peculiar in its taste that is unpleasant, and emitting an effluvium which excites unpleasant sensations; and thus affording us evidence by three senses, what proportion of honey in the hive was collected after the bees had access to the flowers of buck-wheat.

their comb in the form of a frustrum or segment of a globe, and proceed in this way till they have raised it to form a contact with the cover.

Seventhly. The method of keeping bees in boxes that may be separated at pleasure, affords an opportunity of changing the comb in the hive before it becomes dark coloured and apparently rusty, and an unsuitable receptacle for that sweet, delicate, and nutritious fluid, which was the emblem of plenty in ancient Canaan. The purest honey deposited in such comb, loses its transparency and delicate flavour, and partakes, in no inconsiderable degree, of the colour of the comb.

Eighthly. This method of constructing bee-hives affords an opportunity of inspecting them, watching their various movements, and witnessing the progress they make in filling their hive. For this purpose the bees must first occupy the bottom box; and then by lifting up, or removing the top cover, you may, through the hole on the top, see them without disconcerting them until they have nearly filled the upper box, unless you breathe upon them; in this case they will soon let you know that you are an unwelcome visitor. I have inspected them in this way, and through glass windows inserted in their hives, for several years past; and I have beheld with astonishment their industry, economy, singular instinct and ingenuity.

Ninthly. By accommodating my bees with several apartments, I have it in my power to regulate their swarming. If bees are amply accommodated, they will not swarm; but it being an object to make them swarm, I therefore in the autumn reduce the number of their boxes, and leave them generally but two, which, if well filled, will amply supply them with sustenance through the winter.

I do not at first give an early swarm more than two boxes; for they will often send forth a young colony; and when they have done this, add another box, or in a short time take from them the one they have filled, and give them one that is empty. Thus, this method of managing bees will contribute to increase the number of swarms, and eventually make them more profitable; for experience evinces that multiplying the number of swarms makes them more industrious and productive.

To convince you that I have not, in this communication,

been amusing you with plausible theory, but have given you the result of actual experiment, I present you, in miniature, a model of my boxes, with the humane apparatus of obtaining the fruits of their industry, without striking a peaceable and industrious community out of existence.

This communication, with due respect, is submitted to your disposal; and should the writer, by a more humane management of these diligent and profitable insects, or in any other way, contribute to the preservation of their lives and real prosperity, and so add to the resources of his country, he will be well satisfied in the reflection.

THOMAS NOYES.

Needham, March 24th, 1814.

APPENDIX.

THE honey bee is an insect of singular excellence, worthy of claiming the attention, not only of naturalists, but of the public at large. Whether this insect is a native of America is a question, respecting which there is some variety of opinion. Mr. Jefferson in his Notes on Virginia has endeavoured to prove the negative, while Dr. Belknap has more satisfactorily established the affirmative. It may not be uninteresting to the friends of literature to see briefly stated the arguments adduced by these two ingenious and respectable writers in favour of their several positions.

In the American Edition of Mr. Jefferson's Notes in the 79th page, he has asserted, that "the honey bee is not a native of our continent. The Indians concur with us in the tradition that it was brought from Europe, but when, and by whom, we know not. The bees have generally extended themselves into the country, a little in advance of the white settlers. The Indians therefore call them the white man's fly; and consider their approach as indicating the approach of the settlement of the whites." Mr. Jefferson allows that "in Brasil there is a species of honey bee, without a sting, but that is very different from the one we have, which perfectly resembles that of Europe."

Dr. Belknap admits these facts adduced by Mr. Jefferson

as true, but says, "they will not warrant the conclusion that the honey bee, meaning the one resembling that of Europe, is not a native of our continent."

The learned Doctor, in his dissertation on the question, to establish the position that the honey bee is a native of America, adduces the circumstance of Columbus writing a short narrative of his discovery on parchment, which he enclosed in a *cake of wax*, that he obtained from the island Hispaniola, (when his critical situation rendered it doubtful, whether he would be able to reach Europe and convey the happy intelligence, the discovery of the new world,) and put it into a tight cask, and committed it to the mercy of the wind and waves, cherishing a hope that it would be driven on shore where it might be found, or taken up at sea, so that the discovery he had made might not be lost to the European world.

"The indefatigable Purchas," says Dr. Belknap, "gives us an account of the revenues of the empire of Mexico, before the arrival of the Spaniards, as described in its annals; which are pictures drawn on cotton cloth. Among other articles he exhibits the figures of covered pots, with two handles, which were said to be pots of bee honey. Of these pots two hundred are depictured in one tribute-roll, and one hundred in several others."

"This account is confirmed by a late history of Mexico, written by the Abbé Clavigero, a native of Vera Cruz, who from a residence of thirty six years in Mexico, and a minute inquiry into the natural history and antiquities of his country, must be supposed to be well informed, and competent to give a just account. He tells us that a part of every useful production of nature or art was paid in tribute to the kings of Mexico; and among other articles of revenue he reckons six hundred cups of honey paid annually by the inhabitants of the southern parts of the empire. He also says, that though they extracted a great quantity of wax from the honey comb; they either did not know how, or were not at the pains to make lights of it."

"In his enumeration of the insects of Mexico, he reckons six different kinds of bees which make honey, four of which have no stings, and of the other two, which have stings, one agrees with the common bee of Europe, not only in size, shape,

and colour, but also in its dispositions and manners, and in the quality of its honey and wax."

"In the account given by Purchas, of the travels of Ferdinando de Soto, in Florida, it is observed, when he came to Chiaha, which is now a part of Georgia, he found among the provisions of the natives a pot full of honey of bees. This was A. D. 1540, when there were no Europeans settled on the continent of America, but in Mexico and Peru."

"From these anthorities it is evident that honey bees were known in Mexico and the islands, before the arrival of the Europeans; and that they had extended as far north as Florida, a country so denominated from the numberless flowers which grow there in wild luxuriance, and afford a plenty of food for this useful tribe of insects. The inference is that bees were not imported by the Spaniards." Besides it is evident that the report of "honey and wax being found in the islands, in Mexico, and in Florida, had reached Europe, and had been published there long before any emigrations were made to the northward." From the above authority, aided by other evidence, the Doctor infers, "that the honey bee is a native of America, and its productions were found by the first European visitors, as far northward as Florida and Georgia."

If it be an established fact, that bees were in the southern states prior to any European settlements in North America, it is natural to suppose, that they would extend to the northern states. That some were brought from Europe into New England is admitted upon the authority of "Josselyn, who visited these northern states in 1638, and afterwards in 1663, and wrote an account of his voyages with some sketches of natural history, in 1673. He speaks of the honey bee in these words; "the honey bees are carried over by the English, and thrive there exceedingly." If bees were found in the southern states, and some imported into New England, it remains a question that cannot be solved, whether our bees are natives, or brought from Europe, or a mixture of both. Concluding that their appearance is an indication of cultivated land, this by no means establishes the position, "that bees are not natives of this continent;" for we may readily suppose they would flourish much better

where the land is improved, for there flowers grow in greater variety and abundance, than in an uncultivated wilderness.

Some entertain the idea that bees have degenerated, and do not flourish as they did at an earlier period of our country. It is a fact that a new settled country affords them more flowers, than a more ancient settlement; but can we not assign a satisfactory reason for such an effect? This may be accounted for in a considerable degree, on the principle, that they are treated with neglect.

Many persons pretend to keep them without any shelter, and leave them uncovered and exposed to the storms, through the year without contracting the door of the hive, to render their situation more comfortable in cold weather. Nor do they secure them against the depredations of the mice, which take shelter in their dominions, during the winter, when the bees are less active, and consequently more easily injured. In this way their comb is broken and consumed, their honey wasted, the bees discouraged and destroyed. The bees, which I possess, have received more attention; and I can trace back their ancestry through two families, between eighty and ninety years, and I presume there are no visible marks of degeneracy. Let those, who are entrusted with the care of these models of industry, follow the prescriptions contained in the preceding treatise, and they will have the satisfaction of seeing their bees flourish, become profitable, and annually contribute to adorn and enrich their tables with a wholesome and pleasant substance, fill their cup with a generous wine,* and add greatly to the resources of their country.

* Joseph Cooper Esq. of Gloucester county, New Jersey, made the following communication to *the Burlington Society for promoting Agriculture and Domestic Manufactures.*

"I put a quantity of comb, from which the honey had bed drained, into a tub, to which I added a barrel of cider directly from the press. The mixture was well stirred and left to soak for one night; it was then strained, before a fermentation had taken place, and honey was added until the strength of the liquor was sufficient to bear an egg. It was then put into a barrel, and after the fermentation commenced, the cask was filled every day for three or four days, that the filth might work out at the bung hole. When the fermentation had moderated, I put the bung in loosely, lest stopping it close might cause the cask to burst. At the end of five or six weeks the liquor was drawn off into a tub and the whites of eight eggs well beat with a pint of clean sand were put in-

Honey is the purest and most agreeable sweet substance, Providence has provided for our comfort, and was long used before the art of extracting sugar from the cane was known. The productions of this tribe of insects were of singular utility to the eastern nations, and to this day they rank high among the articles of traffic. Mr. Shaw, whose travels extended into the land of Judea, states that Hebron, though much degenerated from its ancient lustre, now sends annually into Egypt three hundred camel loads of this valuable article."

Other modern travellers confirm the scripture declarations, that Palestine was a country that abounded with honey. And though God did not allow his ancient chosen people to offer honey in their sarifices, a satisfactory reason may be assigned for this prohibition. It was offered by the heathen to their idol gods; and the true God designed to keep his people at a distance from the customs of the heathen; but he commanded them to present the first fruits of it to him; and these first fruits and offerings were intended for the support of his priests and not to be offered upon the altar. God gave honey to the Jews for their nourishment; and it was the glory of the promised land, that it flowed with milk and honey; and John, the harbinger of the Prince of Peace, fed on the treasures collected by these industrious insects.

to it. I then added a gallon of cider brandy, and after mixing the whole together, I returned it into the cask, which was well cleaned, bunged it tight and placed it in a proper situation for racking it off when fine. In the month of April I drew it off into kegs for use, and found it equal, in my opinion, to almost any foreign wine, and in the opinion of many others it was superior. This success has induced me to repeat the experiment for three years, and I am persuaded that by using clean honey instead of the comb as above directed, such an improvement might be made and would enable the citizens of the United States to supply themselves with a truly American wine, and it would have this peculiar advantage over every other wine hitherto attempted in this country, that it contains no foreign mixture, but is made from ingredients produced from our own farms."

There is a wholesome and pleasant liquor called Methiglin, invented by Matthew Glinn. This is made by infusing honey into clean water until it will bear an egg; then boiling and skimming as long as any thing will rise; put it into a cask and keep it a few months, and it will be fit for use.

MEANS OF PRESERVING MILDEWED WHEAT.

[N. York Agric. Soc. Publications.]

A FINE piece of wheat being lodged by heavy rains, and being soon after perceived to be infected with the mildew, was cut, though in a perfectly green state, about three weeks before the usual time of cutting. It lay spread abroad upon the stubble until it became dry enough to prevent its caking in the sheaf, when it was bound and set up in stacks. The result of this treatment was, that the grain, though small, was of a fine colour, and the heaviest wheat which grew upon the same farm that season, owing, no doubt, to the thinness of its skin. What appears more remarkable, the straw was perfectly bright, not a speck upon it. The idea of the judicious manager, in whose practice this experiment took place, is, that cutting the crop, "as soon as it is struck, kills the mildew," and on this principle he practises himself, and recommends in general terms the cutting of mildewed wheat as soon "as it is struck." It is well understood that the sap or nutriment, as soon as it is in the stems of grain that is cut unripe, circulates to the ear, and fills the grain in the same or in a similar manner as it would have done, had the stems remained upon their roots. Hence the advantage of cutting mildewed wheat as soon as it is infected with the disease, seems to be, that by thus stopping the disease the nourishment in the straw passes to the ear in a pure, untainted state.

Marshall's Gloucestershire, vol. ii. p. 54.

When the wheat stem has a very particular cast of colour of bluish green, it is surely affected by the mildew.

Young.

ON THE EXCRETORY DUCT OF THE FEET OF SHEEP.

[R. R. Livingston Esq.]

THE diseases of animals and their cure, depending upon an accurate knowledge of their structure, I take the liberty to mention an observation upon that of sheep, which indeed was so obvious, that I conceived no farmer, and much less the naturalist that treats of this useful animal, could be ignorant of it;

Honey is the purest and most agreeable sweet substance, Providence has provided for our comfort, and was long used before the art of extracting sugar from the cane was known. The productions of this tribe of insects were of singular utility to the eastern nations, and to this day they rank high among the articles of traffic. Mr. Shaw, whose travels extended into the land of Judea, states that Hebron, though much degenerated from its ancient lustre, now sends annually into Egypt three hundred camel loads of this valuable article."

Other modern travellers confirm the scripture declarations, that Palestine was a country that abounded with honey. And though God did not allow his ancient chosen people to offer honey in their sarifices, a satisfactory reason may be assigned for this prohibition. It was offered by the heathen to their idol gods; and the true God designed to keep his people at a distance from the customs of the heathen; but he commanded them to present the first fruits of it to him; and these first fruits and offerings were intended for the support of his priests and not to be offered upon the altar. God gave honey to the Jews for their nourishment; and it was the glory of the promised land, that it flowed with milk and honey; and John, the harbinger of the Prince of Peace, fed on the treasures collected by these industrious insects.

to it. I then added a gallon of cider brandy, and after mixing the whole together, I returned it into the cask, which was well cleaned, bunged it tight and placed it in a proper situation for racking it off when fine. In the month of April I drew it off into kegs for use, and found it equal, in my opinion, to almost any foreign wine, and in the opinion of many others it was superior. This success has induced me to repeat the experiment for three years, and I am persuaded that by using clean honey instead of the comb as above directed, such an improvement might be made and would enable the citizens of the United States to supply themselves with a truly American wine, and it would have this peculiar advantage over every other wine hitherto attempted in this country, that it contains no foreign mixture, but is made from ingredients produced from our own farms."

There is a wholesome and pleasant liquor called Methiglin, invented by Matthew Glinn. This is made by infusing honey into clean water until it will bear an egg; then boiling and skimming as long as any thing will rise; put it into a cask and keep it a few months, and it will be fit for use.

MEANS OF PRESERVING MILDEWED WHEAT.

[N. York Agric. Soc. Publications.]

A FINE piece of wheat being lodged by heavy rains, and being soon after perceived to be infected with the mildew, was cut, though in a perfectly green state, about three weeks before the usual time of cutting. It lay spread abroad upon the stubble until it became dry enough to prevent its caking in the sheaf, when it was bound and set up in stacks. The result of this treatment was, that the grain, though small, was of a fine colour, and the heaviest wheat which grew upon the same farm that season, owing, no doubt, to the thinness of its skin. What appears more remarkable, the straw was perfectly bright, not a speck upon it. The idea of the judicious manager, in whose practice this experiment took place, is, that cutting the crop, "as soon as it is struck, kills the mildew," and on this principle he practises himself, and recommends in general terms the cutting of mildewed wheat as soon "as it is struck." It is well understood that the sap or nutriment, as soon as it is in the stems of grain that is cut unripe, circulates to the ear, and fills the grain in the same or in a similar manner as it would have done, had the stems remained upon their roots. Hence the advantage of cutting mildewed wheat as soon as it is infected with the disease, seems to be, that by thus stopping the disease the nourishment in the straw passes to the ear in a pure, untainted state.

Marshall's Gloucestershire, vol. ii. p. 54.

When the wheat stem has a very particular cast of colour of bluish green, it is surely affected by the mildew.

Young.

ON THE EXCRETORY DUCT OF THE FEET OF SHEEP.

[R. R. Livingston Esq.]

THE diseases of animals and their cure, depending upon an accurate knowledge of their structure, I take the liberty to mention an observation upon that of sheep, which indeed was so obvious, that I conceived no farmer, and much less the naturalist that treats of this useful animal, could be ignorant of it;

till I found on speaking on the subject to many experienced husbandmen, and particularly to many members of this society, at a full meeting, that only one of the members had attended to the circumstance I allude to; nor is it noticed by Buffon or by Lisle, who treat largely on the diseases of sheep. This must be my apology to those who find no novelty in the following remark; the legs of sheep are furnished with a duct, which terminates in the fissure of the hoof; from which, when the animal is in health, there issues a white fluid, but when sick these ducts are stopped by the hardening of the fluid.

I have in some instances found that the sheep were relieved, merely by pressing out the hardened matter with the finger, from the orifice of the duct in each foot; perhaps it may be proper in some cases to place their feet in warm water, or to use a *probe* or *hard brush* for cleansing this passage.

May not the ill health of sheep in wet or muddy pastures, be in some measure ascribed to the necessity of keeping the duct I have mentioned free and open?

N. York Agri. Soc. Pub.

NEW INVENTED CHURN.

THE letters of Mr. Halliburton, which follow, and the *drawing* which accompanies them, together with the admirable description of it in the references to the plate, will enable every man to form some judgment of Mr. Halliburton's new churn, and every workman to execute it.

It is certainly a simple, ingenious contrivance, saving much labour, and we believe affording a much more neat mode of cleansing the butter from the butter-milk than any plan heretofore adopted.

It is no new contrivance at which farmers need be alarmed. It is simple, plain, intelligible, and has stood the test of experience. The trustees of this Society directed that one should be made, and they have received it through the kind attention of Mr. Halliburton. It has been repeatedly tried by one of the Trustees, and successfully. A child of six years of age, or even five, can make the butter, while the mother is employed on other work.

If we should venture to propose an improvement, it would be that the hole or opening, and the piece of wood which closes it, should be square instead of oval, and considerably larger, because the butter is formed into a square lump nearly the size of the churn, and it will not drop out of the hole without cutting it. Perhaps it would make the churn tighter, if there was a rabbit round the cover to the hole.

It is certainly true, that butter remarkably well freed from the butter-milk, and equally salted, has been repeatedly made in this churn, by a person who had no other knowledge of the churn, than what was derived from the following letters.

[To the Recording Secretary.]

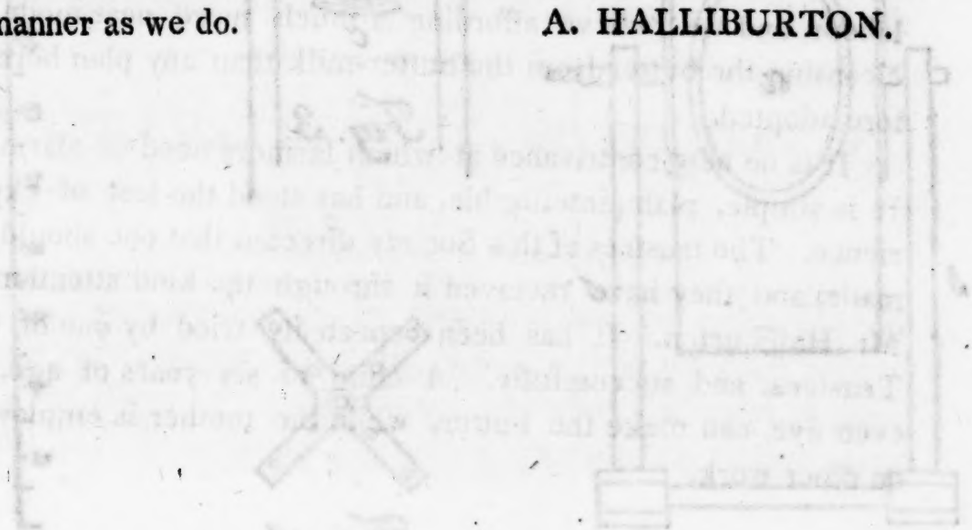
Portsmouth, January 11, 1814.

SIR,

SEEING by an advertisement in a Boston paper that you wish for a mode of making butter, which shall not require in any part of the process the application of the hands to the butter; I take the liberty to lay before you the mode in which my family have made butter for several years past, in a churn of my own invention, of the form of half a cube.

It should be remarked, however, that sometimes the butter will come so extremely soft, that we are obliged, after washing away the butter-milk, to turn the butter out of the churn into a milk-pan, and batter out the water by a wooden paddle—and even this will not answer, until the butter is rendered harder by keeping it a day in some cold place.

My churn has been adopted by a number of families in this vicinity, but I do not know whether they use it in the same manner as we do. A. HALLIBURTON.



PLAN OF A CHURN FOR MAKING BUTTER, PERFECTLY FREE FROM BUTTER-MILK OR WHEY, WITHOUT APPLYING THE HANDS TO THE BUTTER DURING THE PROCESS.

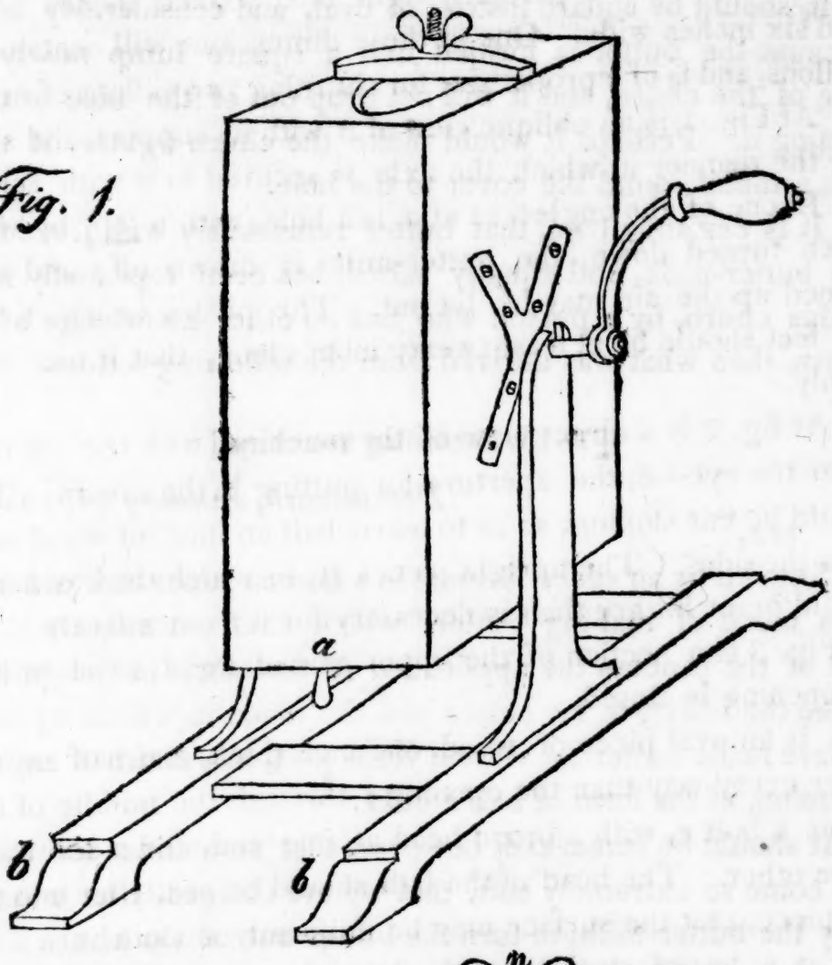


Fig. 1.

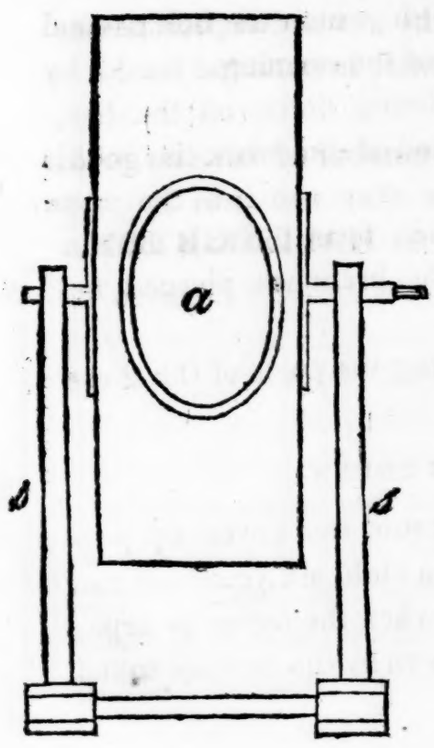


Fig. 2.

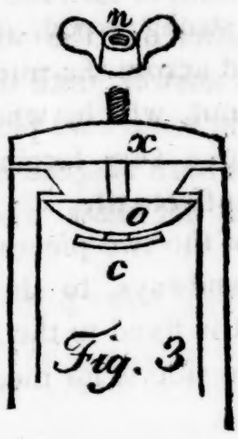


Fig. 3

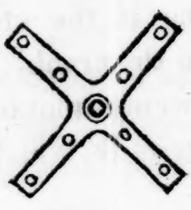


Fig. 4.

DESCRIPTION.

The Churn is a perfectly tight box, sixteen inches square and six inches wide. One of these dimensions will contain four gallons, and is of a proper size for churning two gallons of cream.

At Fig. 1 is an oblique view of it with its support, and shewing the manner in which the axle is secured to it with screws.

In one of the angles, as at *a*, is a hole, with a top, by which when turned down, the butter-milk is drawn off; and when turned up the air may be let out. The pieces *bb* which form the feet should be at least twenty inches long, that it may stand firmly.

At fig. 2 is a direct view of the machine, with the top turned to the eye—*a*, the aperture for putting in the cream. This should be cut sloping, so as to leave half an inch of wood within on the sides. The upright pieces *ss*, in which the box hangs, should be no higher than is necessary for it to turn freely.

Fig. 3 is a section of the upper part of fig. 1, to shew how the opening is closed.

o is an oval piece of wood, one inch thick, and half an inch larger every way than the opening; through the middle of this passes a bolt *c*, with a broad head at one end, and a screw cut in the other. The head of the bolt should be neatly let into the oval piece, that the surface may be uniformly smooth.

x is a bar of strong wood, through which the bolt passes freely, to be placed across the middle of the opening.

n is a screw-nut, which, when forced down on the bar, draws up the piece *o* very forcibly, and if the work is good, closes the opening effectually.

At fig. 4, one of the two pieces which form the axis of the machine is seen endways, to shew the branches, pierced for screws, by which it is fixed to the box.

The scale at the side is for measuring the parts of the three last figures.

MANNER OF USING THE CHURN.

1. After putting in the cream, screw the cover up perfectly tight and turn the crank, (which a child six years old can do,) for fifteen or twenty minutes, and when the butter is separated from the butter-milk, which is known by the dashing sound

occasioned by the butter, draw off the butter-milk by a tap made in one of the lower edges of the churn.

2. Pour into the churn a pailful of perfectly clear, cold water from a good well or spring; close the churn, and turn it round for about three minutes, by which time the butter will form into innumerable small, round lumps, about as big as peas, or grains of wheat, according to the more or less hard state in which the butter first comes, which, by dashing against each other, and the square sides of the churn, will become very solid, (aided by the cold of the water,) and be entirely free from any butter-milk or whey.

3. Draw off the water, and put in another pailful; turn the churn one or two minutes; then draw off the water again; and so continue to do, until the water comes out as clear as when first put in.

4. Let the churn remain at rest with the tap downwards until no more water will drain out; then, while the butter is in this very divided state, scatter among it rather more than the usual quantity of finely pulverised salt, stirring the butter with a clean stick, so as to salt the butter very uniformly throughout; then close the churn and turn it round slowly, and the butter will form into one solid lump. Continue to turn the churn for about ten minutes, so as that the butter may fall with force against the sides of the churn, occasionally stopping to let the water squeezed out run from the tap, and when no more water appears the work is finished.

[To the Corresponding Secretary.]

Portsmouth, April 7, 1814.

SIR,

Agreeably to your request, I have caused a churn to be made, and have delivered it to the waggoner of Messrs. Shaw and Leavitt, who has promised to deliver it you without injury.

The cost of the wood work and painting is	$2 50
do. iron work,	1 75
	$4 25

The joiner and blacksmith whom I employed, have not made it so neatly as I desired, but I hope the operation of it when tried will equal the anticipations excited.

You ask me why the butter does not pass off with the butter-milk and water. The answer is, that the butter, being lighter than water or milk, necessarily floats at the top; consequently all the water must pass off before any of the butter can descend to the hole, which at this time is placed at the lowest corner of the square.

In trying this churn, if the butter should not come so soon as I have mentioned in my former letter, some allowance ought to be made for the season of the year, the comparative thinness of the cream, and also the too general want of knowledge of the proper temperature of the cream, when best disposed to churn speedily.

The following are some of the variations I have observed in the churning of butter *in this kind of churn.*

1. When the cream is thin, and too cold, it will sometimes take an hour to churn it, and it will then come in lumps as big as robbins' eggs.

2. When the weather has been long very hot, and the cream at the time of churning is too warm, the butter will come so soft, that the little particles will stick together with the slightest touch.

3. When the cream is in the best possible state, if the churning is too long continued after the butter has come, the little lumps and grains will sometimes unite into lumps as big as a hen's egg, which ought to be avoided, because the butter is best washed from the butter-milk when in the state of small, hard grains.

In using this churn, care is to be taken that a too swift motion is not given to it, because the cream will thereby acquire a centrifugal force—perhaps the proper motion is fifty or sixty turns in a minute, to give it its greatest force. It ought not to be filled more than half full nor less than one eighth. I think ten pounds of butter is the utmost quantity that can easily be churned in one of this size.

In putting in or taking out the cover, the screw should not be turned entirely off, but merely loosened, the cross stick serving for a handle to the cover; and when the butter is completely finished, the mouth of the churn is to be turned downward, so that the lump may fall into a clean dish, and by means

of a fork, be placed into a pickle tub, and kept constantly under the strongest brine until used.

I hope you will pardon my prolixity, when I assure you that it is occasioned by a desire to promote the objects of so useful an institution as the Massachusetts Agricultural Society.

ANDREW HALLIBURTON.

NOTE. As it may be wished that a plan should be devised to enable farmers to make butter, (if they choose,) through the whole summer, I give the following mode, as adopted in my family. Let a shallow box or trough be made of boards, eighteen inches wide, five inches deep, and from ten to twenty feet long, with a cover to shut out flies, &c. place the milk-pans in this; then let a constant small stream of cold water run into it at one end, and out of it at a hole at the other end, only so that the water shall not rise in the box high enough to flow into the pans, and the milk will be kept perfectly cool in the hottest weather, and the cream capable of being churned.

MACHINES FOR RAISING WATER FOR THE PURPOSE OF IRRIGATION, OR WATERING LANDS.

THE Committee appointed by the Board of Trustees to consider the merits of several machines for raising water, presented for the premium offered by the Board, having attended to the business referred to them, beg leave to report, that they are gratified with the prompt attention which several gentlemen have paid to the invitation of the Trustees, and the ingenuity displayed in the several machines.

The fertility of land has been considerably increased by the practice of irrigation in Europe, and it was the opinion of the Board that the introduction of this useful process here would be beneficial to the agriculture of our country.

To this end a simple and cheap machine was requisite to raise water for the purpose; a premium was therefore offered for such a machine. To be extensively useful, it should be simple, that it may be easily constructed; and not attended with much expense, that every farmer who has water on his grounds

may avail himself of it with a rational prospect of indemnification.

A current of considerable velocity, or a situation where a head of water may be obtained, is not possessed perhaps by one farm in fifty; the machine therefore in which a water wheel is the moving power, and that with forcing pumps which requires a head of water, both which would, no doubt, be adequate to the intended purpose in favourable situations, do not come within the views of the Trustees.

The author of the communication marked △ seems fully aware of the desire of the Trustees; but the Committee apprehend that one of the materials to be used in the construction of the propellers, will not be sufficiently durable in contact with water, and that there may be considerable difficulty in attaching it to the other parts.

They apprehend too that the estimated expense of the machine is very much below what it would really prove; that the supporters of the moving power are placed too low to receive the influence of the wind, and if elevated to a sufficient height, could not be managed with ease and expedition in sudden and violent gusts.

The Committee regret that in the draught of this machine, the proportions of its several parts have not been attended to, and are therefore not able to form a correct judgment of its practicability. They desire a further communication from the author on all the points above stated.

March 26, 1814.

At a meeting of the Trustees of the Massachusetts Society for promoting Agriculture, the above report having been read, was accepted, and ordered to be published. The author of the communication, marked with a triangle, is requested to consider the objections stated in the above report, and to make such remarks thereon as he may think calculated to obviate them, if they can be obviated. The publishing Committee return the thanks of the Trustees to him and to the other ingenious gentlemen who suggested projects for the same purpose. They invite them also, and all others who have a taste for, and knowledge of mechanical or philosophical arts, and especially hydrau-

licks, to turn their attention to this interesting desideratum, that of raising water at a cheap rate, for the purposes of irrigation.

The Trustees do not presume that the small premium which only their limited funds enable them to offer, will be any strong inducement, but they rely on the patriotism of the men of science and mechanical knowledge, who must recollect that a person who should invent a cheap machine calculated for general use for this interesting purpose, would be deservedly esteemed a great benefactor to his country.

AGRICULTURAL INTELLIGENCE.

A quantity of wheat was raised the last season in Medford in the county of Middlesex by Capt. John Symmes, without any appearance of blight or mildew.

An attempt is making the present season to raise hemp upon some of the intervale lands on Merrimack river in the state of New Hampshire.

The shepherds in Spain cure the scab in sheep with an ointment made of the trunk and roots of the Juniper, by breaking them into small pieces, and infusing them in water; without adding any thing else.

It has been found that mixing a small proportion of any kind of oil with the tar used in tarring trees, preserves it in so moist a state for some time as to preclude the necessity of repeating the operation so frequently, as heretofore has been found necessary.

The common mustard seed which grows with very little cultivation, and is easily gathered and cleaned by those farmers, who have floors for threshing wheat or flax seed, is worth from three to four dollars per bushel. An acre of good land will produce from fifteen to twenty bushels.

To make good butter in hot weather. The day before churning scald the cream in a clean iron kettle, over a clear fire, taking care that it does not boil over. As soon as it begins to boil or is fully scalded, strain it, when the particles of milk which tended to sour and change the butter are separated and left behind. Put the vessel, into which it was strained, into a tub of water, and place it in a cellar till next morning, when it will be ready for churning, and become butter in less than a quarter of the time required in the common method. It will also become hard with a peculiar additional sweetness and will not change. The labour in this way is less than the other, as the butter comes sooner, and saves much labour in working out the butter-milk. By this method good butter may be made in the hottest weather.

The Rev. F. Haggitt, Prebendary of Durham, England, has lately stated a successful experiment for saving the consumption of flour in making bread. Mr. Haggitt gives the following account of the process: I took five pounds of bran, boiled it, and with the liquor strained from it, kneaded 56 pounds of flour, adding the usual quantity of salt and yeast. When the dough was sufficiently risen it was weighed, and divided into loaves; the weight before being put into the oven being 93 pounds 13 oz. or about 8 pounds 10oz. more than the same quantity of flour kneaded in the common way. It was then baked two hours and some time after being drawn, the bread was weighed, and gave 83lbs. and 8oz.—loss in baking 10lbs. and 5oz. The same quantity of flour kneaded with common water loses about 15lbs. 10oz. in the baking, and produces only 69lbs. 8oz. of bread; gain by my method 14lbs. that is, a clear increase of one fifth of the usual quantity of bread from a given quantity of flour. He also states that the bran, after being used in this way, is equally fit for many domestic purposes.

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ERRATA

In last publication (No. 1. Vol. III.)

Page 42, line 23, for "*a* paper mulberry," read, *or* paper mulberry.
55, — 2, from bot. "As in all parts &c." read, A small part, &c.
56, The word *rocky* in the first line ends the answer to the 2d question. The twelve following lines are part of the answer to question 5th, and should follow the word *bushels*, page 57, line 2.
58, — 14, for "howed," read, hoed.
61, — 28, dele semicolon after *&c.* and add a period after *winter.*
— — 30, add a period after the word *corn.*
— — 31, dele period after *salt-water.*

ERRATUM, (No. 2, vol. III.)

Page 154, line 3 from bottom, for "ferina," read, farina.